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How To RAISE

PROFITABLE
POULTRY

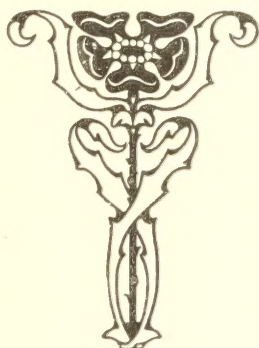
A
PRACTICAL BOOK

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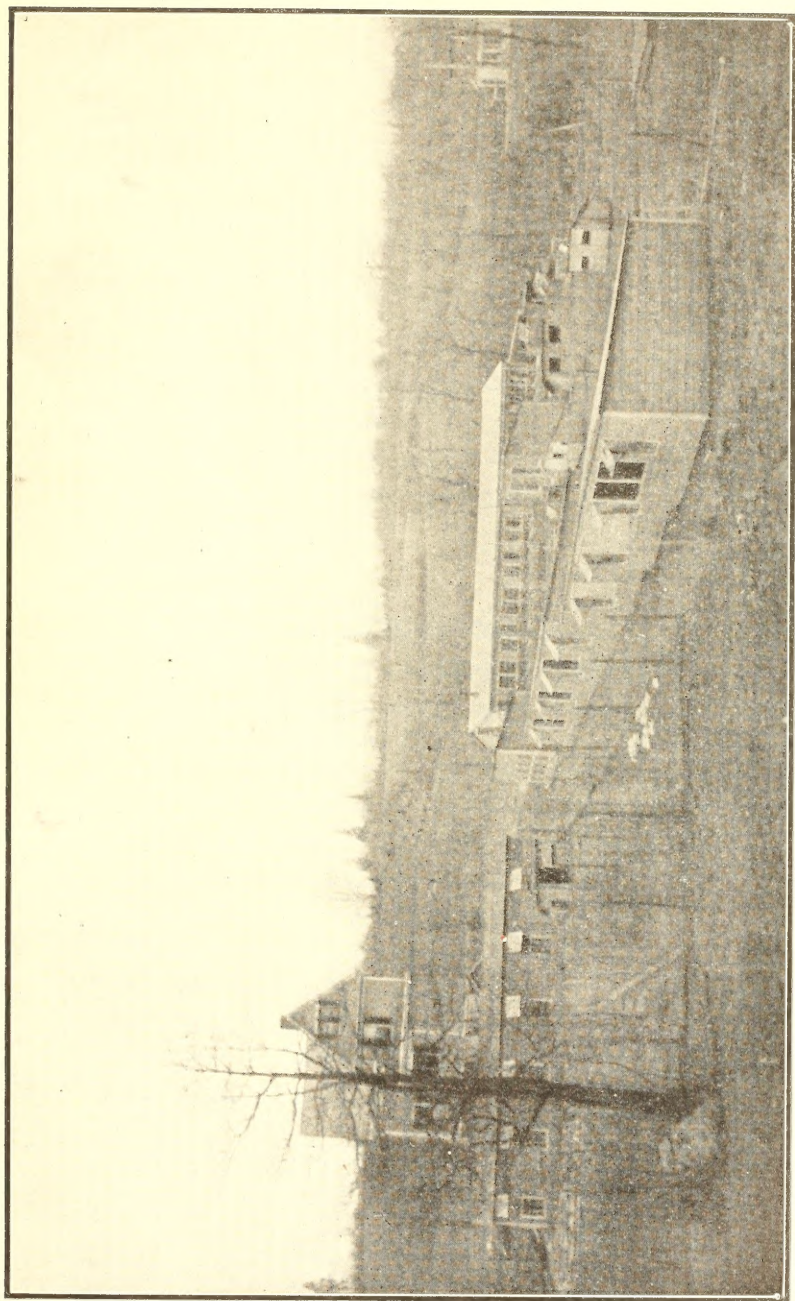
HOW TO RAISE PROFITABLE POULTRY

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A WELL ARRANGED POULTRY PLANT

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CHAPTER I.

THE OCCUPATION.

All those who engage in the poultry business may be classed under three headings, according to the principal motive that actuates them in taking up the care of chickens. The first classification would include all those who keep chickens because they desire recreation; or this may be termed their "hobby." The second classification includes those who are tired of paying high prices for poultry, meat and eggs and desire to keep sufficient fowls to supply these products for their own table consumption. Then there are under the third heading, all the legion of persons who are tired of the ordinary business grind, and city life, and who desire to enter some occupation that will be congenial and, at the same time, remunerative. It is true that there are some persons who are inflamed by reports of exaggerated profits that have been made by a few, and who think that the poultry business is the long-looked-for industry with "millions in it," to be made with little or no effort, but this class of persons will not be discussed here. The few who do start under this misapprehension are usually the ones that add only to the list of failures.

There are many professional men who are sufficiently well fixed with this world's goods not to feel the lure of the profit that may be derived from keeping chickens and who are not obliged to depend on the returns to pay for the actual expenses incurred, who desire to take up some "hobby" for the recreation it will afford them. Physicians, lawyers, ministers, and all who have a great deal of mental work and strain, find in the poultry industry the necessary recreation, and change from mental to physical, and from indoor to outdoor labor. Persons who are unable to get out of doors but an hour or two during the day have found that the care of a few chickens will give them sufficient exercise to alleviate the depressed feeling of being confined all day long. Invalids and others who may be incapacitated for work in some lines, are able to care for poultry without overtaxing their strength. As a hobby, keeping chickens affords the double satisfaction of pleasing recreation and healthful occupation.

It makes little or no difference whether the present high prices for general food products are caused by an excess of demand over supply, or the methods of the cold-storage operators, the increasing population or any other cause, the result—high prices—is an actuality. There are a great many persons of moderate means who would like to have on their table poultry products, but who are unable to pay the prices asked. If such persons have some available space in their yard, they quickly come to the conclusion that it would be feasible, as well as economical, to raise chickens themselves and save the various profits that are made by the "middle men." Hence, some fowls are purchased, coops are built and the miniature poultry plant springs into existence.

Under the present business methods, and the keen competition that is everywhere apparent in the mercantile world, the man who is not a specialist of an exceptionally high order, or an expert, becomes merely a cog in a big wheel. His individuality is almost entirely lost. He goes to his daily work and if, for any reason, he is unable to keep up with the increasing demands, he either drops out or is dropped, and another immediately takes his place. It is only with an ever-increasing struggle that one can keep up with the enervating daily "grind" of business life. Many a man longs for the time when he can take things a little easier, but usually this opportunity seems far off. There are times innumerable when every business man (and particularly those who live in the cities) will soliloquize in this way: "I'm so tired of the hurry and rush and nervous excitement of business life. Oh, if I could only get away somewhere, where I would not have to rush and drive every moment; where I would not be hemmed in by four brick walls; where I could breathe pure air and enjoy the beauties of nature, and live an ordinary, sensible and peaceable life!" It is at such times (and they come frequently to all) that one casts longing glances about him for an occupation that will afford a fair living—all he is getting at the time—and which will allow him to be somewhat independent—to be a Man. To such, the poultry business appeals very strongly. And well it may.

There *is* a living in poultry. There is more than a living, if one is willing to give the same time and energy and brains **AND BRAWN** to this business that he would devote to any other line to make a success of it. We live in a day of specialists, and those who expect to get a profit, as well as a living, from the poultry business must specialize this work. This necessitates study, care, and application to the minor details that go to make up the business as a whole. Chickens that are neglected or that are expected to care for themselves will lay about enough eggs in a year to pay only for the food they consume, and little net profit can be expected from them. But fowls that are well cared for will always pay a handsome dividend on the investment.

The natural question propounded by those not familiar with the inner details of the business is: "How much net profit can be derived from a hen in a year?" There are so many different matters that control the amount of profit made that it is impossible to state any exact amount. No two flocks will return exactly the same profit. The care, feed, attention, housing, and quality of the birds, the marketing of the products, the amount of help necessary to operate the plant, the success in hatching and raising the chicks, the sale of stock, etc.—these, and innumerable other things, all govern the profit one can make.

When one develops a heavy-laying strain of fowls, or gets the "fancier's" fever, and builds up a strain of exhibition birds, the net profits will increase with remarkable rapidity. The sale of hatching eggs and day-old chicks, at prices considerably in advance of those received for eating eggs, of course, will also enlarge the receipts and net profits. As has been said, there are so many things entering into the matter that it is very difficult to state any exact amount that may be realized from a flock of hens.

From the viewpoint of health, the poultry business is particularly inviting. The exercise one takes, in caring for the fowls, outdoors, under the blue skies, expanding the lungs and breathing in God's own free, pure air, will make rich, red blood to flow vigorously through one's veins; it will develop good muscle and build a constitution of iron; it will make a sick man healthy and a well man healthier. To those who love nature, the poultry business affords an excellent oppor-

tunity to get into the open air and sunshine, on cold and warm, on pleasant and unpleasant days, and one has an excellent chance to see Nature from many different viewpoints and to appreciate and enjoy her many changing phases and unsurpassed beauties.

Though the term "man" is used in this book, it should be understood that this includes both the masculine and feminine genders. It would be quite untrue, as well as unjust, to say that only men are engaged in the poultry business, for there are numberless women successfully carrying on this industry, both with and without the aid of men. It is hard to explain why women do not come to the fore and claim the important place in the poultry world to which they are entitled, unless it is because, in their modesty, they hide their light under a basket. Generally, women do not figure prominently in the business side of the poultry plant, though many are quite capable of this, too; but they far excel men in their care of, and chances of success with, chickens. Some one has said that patience is "seldom in a woman," but if the truth were told, in displaying this virtue with live stock (and young stock, in particular), women have us poor men "beaten to a frazzle." Man in his "bigness" does not see the little needs and small necessities that will add much to the comfort of young stock, yet a woman will perceive such things instantly. And possessing the indispensable patience to "fuss" with them, women will do the many little things that will help the little chicks over the rougher places in their lives, thereby largely decreasing the great loss from this source and increasing the chances of chicks living. And this care and love for the little tender puff-balls grows as the chicks grow, and instead of tiring of the game as quickly as a man, a woman will give as much attention to the grown fowls as when they were smaller. Woman is the indispensable helpmate of man, and in no place is this more clearly shown than on the poultry plant.

CHAPTER II.

THE MAN. GENERAL REQUISITES FOR SUCCESS

The question is frequently asked: "I have \$1,000 capital, and would like to know if this would be sufficient to start in the chicken business, and what are the chances of my making a living from it?" There is very little possibility of giving a definite answer to this inquiry. To cover the whole matter at once, entirely and concisely, the reply might be given: "It all depends on THE MAN"; or, to make it a little more pointed: "It all depends on YOU!" After all, when everything is sifted down, one finds it isn't a business that makes a success of itself or of the man engaged in it; but it is the man, with his mind, and will-power, and energy, and good judgment, etc., etc., that is the foundation on which the success is built.

It is a greatly mistaken idea that "anybody can keep chickens." The man who goes into the poultry business needs just as much brains, business sagacity, etc., as is necessary to succeed in any commercial or mercantile line. There are just as serious problems to deal with, just as many trials, disappointments, etc., to contend with, just as much energy and push needed, just as much good judgment necessary, and just as much honesty and principle to be used in the poultry business as in any other kind of business. It isn't, by any means, a catch-all business for any old sort of a person to go into and get an easy living from. People who have made a failure in almost everything else they have tried may succeed in the poultry business, but their chances are only about one in one hundred.

A prime requisite of the poultryman is an innate love of animals in general and chickens in particular. The man who loves his fowls will do everything in his power to add to their comfort, and he is justly rewarded by them for his pains. There is all the difference in the world between fowls that are well kept and well cared for and scrubs that have to take care of themselves. Any flock of chickens will quickly reflect the good care and attention that may be given them, and a man who really loves his fowls cannot be cruel (even by neglect) and permit his birds to suffer through any fault of his. A man's poultry is said to be his mirror—it reflects better and more truly his attitude toward his fowls than anything else he may say or do. With a love of animals frequently goes a love of Nature and outdoor life, and these two combine excellently in the chicken business. The work of caring for the fowls is largely out of doors, and those who dislike to be "penned up" in an office or who dislike indoor work will find much solid satisfaction in being able to work outside with poultry.

To accomplish anything in the poultry business one needs a great amount of perseverance and stick-to-itiveness. Cast your eye over the list of leading poultrymen and you will note that all have been in the business for years. It takes time to learn the ins and outs of this business, with its many different phases and branches. A steady-going "plodder" will accomplish more in the long run by his slow but sure way of doing things than the man who works like a Trojan for a while and then does nothing for a longer while. The poultry business is not one of minutes or hours but a 365-day job every year (some years 366!), and it takes a pretty steady disposition to stand the pull. Slow progress is sure progress, and though some give way, the fittest survive. And in this respect the poultry business may be classed with all others: "Eternal vigilance is the price of success."

Slipshod methods are not in place on the poultry plant; if followed long enough, they positively insure failure. "That's good enough" and "Oh, that'll do!" are not slogans the poultryman should adopt if he wants to be classed among the leaders. It requires bright, up-to-date methods to make a success of any business, and the lazy man will not find his sinecure in keeping chickens.

Patience is a positive virtue and an actual necessity for any one who expects to make the most of his poultry. The business in general is largely a repetition of small details, day after day. If one cannot fasten his attention to one small duty at a time and be willing to work at that until it is finished, he had better think twice before starting in this business. And, further, this same duty will probably have to be done to-morrow, and the next day, and perhaps every day throughout the year. Without an infinite amount of patience these recurring duties may become irksome and will then be neglected, with sad results. Lest someone be frightened by these remarks, let it be said that ordinarily every man in any line of business pursues the same routine day after day. But it takes a larger bump of patience to respect the demands of dumb creatures than it does to obey the sharp commands of an employer who is backed with the power to "hire and fire."

One who can be a "Jack of all trades" to a certain extent will find daily use for his capabilities. While there are certain things that one can have done by hiring outside labor, the net profit at the end of the year will be just that much less. If one can handle a saw and a hammer, though far from being an experienced carpenter and joiner, many a dollar will be saved by being able to accomplish necessary work without outside aid. It is expensive to hire labor to build coops, and to saw every board and drive every nail needed. If one can "push a paint brush," this will also save many a dollar, both in the cost of labor and preservation of the building. These and other sim-

ilar capabilities, while not so absolutely essential as to prevent one from making a success of the business if he does not possess such advantages, will keep the expense account down and thereby materially aid in swelling the profits.

CHAPTER III.

CHOOSING THE BREED

When one has definitely decided to keep chickens, the first thing that should be done is to decide just what is the exact object in view. When this matter is settled, it will also indicate, to a large extent, the breed of fowls that is to be kept. If the fowls are to be kept as a hobby and for the pleasure and amusement that one will get from caring for them, the breed that suits the fancy of the individual will be the only breed to choose. As the monetary returns that are received under this plan are secondary to all else, no consideration need be given the matter of whether the birds will be an expense or a source of revenue.

In the case of keeping fowls to supply meat and eggs for one's table, the main thing to be considered is to get a general purpose fowl. By this is meant a breed of fowls that will lay a fair number of eggs during the year, and when the bird's usefulness in this respect is over, to have a fowl that possesses sufficient meat to make a good meal for an average family. Birds of this type will also usually produce broilers for home consumption that can be used at a comparatively early date and yet be of fair size. If eggs for home consumption are desired primarily, it would be best to choose some of the lighter breeds that are noted for their prolific egg production.

If one is starting to keep chickens with the ultimate idea of enlarging the plant until it is of sufficient size to support one or more persons, the choosing of the breed will require much thought and a great deal of care. To make the mistake of choosing a breed that later on will prove to be unavailable for the business needs or the demands of the market, will mean the loss of much valuable time and money. To change from one breed to another is also very expensive and troublesome. It is, of course, very hard for the beginner, without any previous experience, to know just what breed would be best to suit future conditions. There are, however, certain fundamental conditions that will disclose to the careful thinker the route he must follow, and what will be best under existing circumstances.

There are three branches of the poultry business under which all the breeds of poultry may be classed, as follows: Eggs, meat, broilers. Certain breeds are egg producers; others are better for the production of meat for market purposes, and still other breeds should be chosen if one is going into the broiler business. When it is said that the principal branch of the business followed is the production of eggs, this does not preclude absolutely the production of meat or the sale of broilers. It simply indicates that it is this particular branch of the business that is featured, and the other things are of secondary consideration. This same idea applies to all the branches of the business.

The principal thing that should govern the decision of those who have had no previous experience in the matter is the market conditions. The demands of the market to which one will cater should be given preponderance over all else. This will make the disposal of the products far easier than if other things are given preference. For instance,

if one is near a market that demands and can consume an enormous quantity of strictly fresh eggs, and will pay remunerative prices for them, it would be very poor judgment to produce broilers principally. And where the prices and demand for broilers are greater than can be realized from the production of eating eggs, to follow the latter branch of the business would be wasting one's ammunition.

It is quite an easy matter to ascertain the preferences of the local markets, and with this in mind the choice of a breed is narrowed down very much. If, for instance, one finds that the market to which he will cater has a greater demand for eating eggs than for all other products of the business, the choice of a breed would naturally fall among those varieties which produce a maximum number of eggs in a year, regardless of whether the fowl weighs three or six pounds. As there are numerous breeds which produce about the same number of eggs per hen per year, the further demands of the market should be looked into. This may disclose the fact that there is a premium paid for eggs of a certain weight, or color. In the case of the New York market, a premium of five cents a dozen is paid for white-shelled eggs. In the vicinity of Boston the brown-shelled egg is preferred. Someone may say: "What's five cents? Too small to notice." But where two thousand hens are kept, that shell out fifteen dozen eggs per hen per year, this five cents means just fifteen hundred dollars extra received—a neat sum to be added to the profit side of the ledger.

In localities where eggs are sold by weight it would be rather foolish for a man to keep a breed that lays nineteen-ounce eggs to the dozen, when another breed will lay eggs weighing twenty-four to twenty-eight ounces to the dozen on about the same quantity of food consumed. These little things are what count in the long run, and to figure them out *before* a start is made in many cases will prevent ultimate failure.

Secondarily, the choice of the breed may be governed by the preference of the individual. This preference, however, should never be given greater weight than the demands of the market. After it is found that there are a number of breeds that will fulfil the demands of the market, the particular breed that comes nearest to suiting the taste of the individual will be the best breed to choose. Other things being equal, it is undoubtedly true that greater success will be achieved when the chosen breed suits one's tastes and preferences than when it is a breed in which keen interest is lacking.

It should be the object of the beginner, before finally deciding on the breed or variety upon which he will base his chances of success or failure, to gain as much knowledge of the various well-known breeds of poultry as possible. Numerous books can be easily procured which fully describe, in an unbiased way, the merits of the different breeds. From such a source at least a decided preference will quickly be formed. At this point it would be well for the novice to go to one or more poultrymen who have been sufficiently long in the business to have lost the first glamour and excitement which might bias their opinion, and who have had sufficient practical experience to enable them to give a proper decision in the matter. Tell them of your tastes and the preferences you have formed; of the demands of your market, and all the circumstances in the matter, and ask for an unbiased opinion. In most cases a poultryman will be glad to give his best judgment, regardless of the particular breed he keeps. Then by combining one's preference with the advice received from a practical poultryman, and taking into consideration all local conditions, it should be a comparatively easy matter for any one to decide definitely on the breed of fowls he will keep.

CHAPTER IV.

THE LOCATION AND CONSTRUCTION OF THE COOPS.

When one starts keeping poultry much careful consideration should be given the matter of the location of the plant. If the beginner would save himself considerable work and perhaps much worry later on, he would plan ahead definitely where his coops are to be located. This is one item which should be clearly decided before any stock is bought or orders placed.

A practical poultryman, who has achieved considerable success, when asked how he was able to incorporate so many satisfactory details in a big coop he had recently built, replied: "I was building that coop for six months before I drove a nail!" In consequence, there are no "mistakes," and the building is well-nigh perfect for the use for which it was designed.

With small coops there is not a great deal of labor to shift them around when it is desired to make a change, but why not take into account as many possibilities and contingencies as one can beforehand, rather than to leave it all to experiment or "chance"? It may be a decidedly costly experience to find a lot of chicks drowned some day after a heavy rain, when a little study of the situation would have disclosed the fact that the brooder coop was being placed in a hollow.

Location.

Of course, the ground that is available will control the situation somewhat and perhaps even the size or number of coops. But whether much or little ground may be had, one should plan along a definite line—both literally and figuratively speaking. Nothing is more indicative of a person's disposition than his poultry plant. If one is lazy, shiftless, careless, or slovenly, it will show at once on his place. If, on the contrary, care, attention to details, neatness, etc., are in a person's makeup, these traits will also make their appearance in a well-kept, clean poultry place. The coops will all be laid out in line and harmonious in their entirety. As the flock is enlarged, and new coops are added, they will be so placed as to conform to the general scheme of the place. Such a poultry plant is as much a pleasure to look at as it is satisfying to the one who planned it.

One of the most important elements entering into the location of a plant, aside from the ground available, is the character of the soil. Sandy or gravelly soil is the best that can be had for poultry, as it absorbs the droppings quickly, allows the rain to filter away rapidly, and will remain sweet longer than a heavier soil. Where a soil is inclined to be of a clay nature, it can be lightened by first loosening it and then introducing sand, ashes, or the like.

After the character of the soil is determined, one should look sharply to the grading. The higher the general level of the plant the better, but in any case the coops should never be placed on very low ground, or in a hollow. The ground in the immediate vicinity of each coop should be raised, if necessary, by filling in, and then graded off in all directions. Ground which slopes one way, preferably to the south or east, makes a satisfactory place on which to keep poultry, but care should be used not to set a coop where it may be in the direct

course of water that runs off after a sudden downpour. By looking well into some of these important points before locating the coops, one will prevent dampness, perhaps even saving his chickens from worse fate.

It is important to have as much sunshine enter the coops, in winter especially, as possible. Sunshine is one of the greatest purifiers and disinfectants known, and, aside from this valuable service, produces a warmth so necessary to and so appreciated by laying hens. Coops with southern or southeastern exposure will receive a maximum amount of sunshine, and if the glass in the coop is properly placed the chickens can enjoy a sun bath the greater part of every pleasant day.

In laying out a new poultry plant take into consideration the matter of accessibility. That is, the entire flock should be housed so that the attendant can get to each and every house in the least space of time and with the smallest amount of walking possible. This is not a lazy man's proposition. Some day when a wind or rain storm comes up suddenly, and things must be made "snug in a jiffy," if one's coops are easily reached, serious loss may be averted. On the contrary, lack of attention may be fostered by a combination of a protracted spell of rainy weather and inaccessible coops.

As much protection from high winds and driving rains should be given the coops as circumstances will permit. This can be accomplished by locating the coops near heavy shrubbery, on the "lee side" of a house or barn, or beneath trees.

The advent of young stock may bring with it the discovery that no space has been allowed for the brooding and raising of the chicks. This short-sightedness sometimes necessitates the rearrangement of practically the entire plant. While fifty or a hundred chicks may be kept in a comparatively small space the first week or two, they grow rapidly and very soon need larger quarters. These must be provided, and fortunate, indeed, is he who has planned ahead far enough to make allowances for the natural expanding of his flock.

A consideration which some may have to take into account is that of protection from thieves. It seems that some localities are more subject to depredations from these pests than others. Where such is the case, one should take full precautions to guard against loss. While each person can best judge what to do according to his local conditions, one general feature is important: the plant should be so located that practically every part of it is in full view all the time. Then one should in various other ways be fully prepared to give any marauders a "perfectly good reception." Where possible it will be found very advantageous to have a bright light, either burning all night or so arranged that it can be flashed on at any time to illuminate the entire place, thus making detection of a thief a comparatively easy matter.

Construction—Size and Style.

The size of the coops, and the number, will depend, first, on the amount of capital one decides to put into the business, and, second, on the amount of ground available. A long continuous house costs less to build than a number of smaller, separate coops. It is also cheaper to build a house that is approximately square, or in square units, than it is to build a long, narrow house. Thus, a house that is sixteen feet square would cost less to build than one that is six feet wide and about forty-three feet long, though the square feet of floor surface in each would be the same.

In constructing a poultry house, the size should be made as large as one can possibly afford at the time, even though part of the house may not be necessary for immediate requirements. As the business expands (and in nine cases out of ten it will expand), a large-sized house will obviate the necessity of continually building more coops, taking valuable time and labor when perhaps it can be ill-afforded.

In estimating the size of coop one will need, it is safe to figure to give each fowl three square feet of floor area in coops smaller than eight by ten feet, and two and a half square feet per fowl in larger sized coops. Thus, a coop eight by ten would house about twenty-five fowls, while a building twelve feet wide and forty-eight feet long would comfortably house two hundred fowls or more. The lighter, smaller breeds will need quite as many square feet of floor space as the heavier birds because the former are more active.

All poultry houses should face either south or east, preferably the former. This will permit a maximum amount of sunshine to enter the coops during the greater part of the day.

The style of house will depend on the capabilities of the builder primarily, and on the amount of money one figures to expend. A one-span roof—or, as it is usually called, a “shed” roof—is by far the easiest type of building to construct. For a poultry house it has the very important advantage of affording a high front, permitting the sun's rays to reach farthest back into the coop to purify the ground and warm the interior. There will be only one line of eaves-trough necessary, as all the rain water is thrown to the rear, and this also keeps the front of the building dry. The pitch of the average one-span roof need not be much over one-quarter—that is, one foot rise in four feet of width.

The combination roof (which is usually about two-thirds shed style and one-third gable) and the gable roof are both exceedingly difficult for an inexperienced person to build. The advantages are so few that these roofs are in the minority on the average poultry plant. If one is to have the coops constructed by experienced carpenters, however, either of these roofs can be chosen if it is the preference of the individual and will prove fairly satisfactory for most purposes.

The height of the sides of the building will depend on the style of roof. The principal factor to be considered is to afford sufficient head room, otherwise keeping the roof as low as possible. A high roof creates too much unnecessary air space and will make a cold coop in winter. The rear wall should be as low as is consistent with needed head room, thus minimizing the northern vertical exposure and cheapening the cost of both lumber and construction. When figuring the height of the rear wall, it should be remembered that it need not be quite the necessary height to walk under, as the dropping boards will prevent one from getting within three or four feet of the wall. The rear wall, and the end exposed to the worst weather, should be covered with double matched boards with double paper between.

Floors may be put into the coops if desired, but they add considerably to the cost—usually from one-fifth to one-quarter. Floors must be kept covered with sand or straw at all times. Concrete floors are sanitary and usually rat-proof, but are very cold in winter, and in this respect may interfere with a good egg yield. A good dry dirt floor will generally give the most satisfactory results, all things being considered.

The matter of ventilation for the coops should receive very careful attention. Present-day methods of housing chickens are quite the contrary of those pursued some years ago. Now the coops are made so that they will absolutely prevent draughts, but a circulation of air is

constantly going on in them. Air is usually admitted through so-called "open-air fronts." The front of the building is not entirely open, but open spaces of varying sizes are covered with cheap muslin, through which the air gently sifts in and out. This creates sufficient circulation of the air inside the coop to remove moisture and to purify the air, without making any direct draughts. The muslin openings remain the same throughout summer and winter. During excessively cold nights a curtain of burlap or cheap unbleached muslin may be drooped in front of the roosts to assist in keeping the fowls warm while they are inactive. The usual proportion of muslin placed in the front of the coop is about one square foot of muslin to ten square feet of floor space. Thus, for a pen ten by twelve feet the amount of muslin would be about three feet by four feet.

The windows of the coops should be placed as high in the front of the building as possible. This will permit the sunshine to reach farthest back in the coop, especially during the winter months. Care should be taken not to put too many windows in a coop, or it will be cold, particularly at night. Glass radiates heat at night as rapidly as it collects it in the daytime. Either eight by ten or nine by eleven is a good size light to use. The former come in six and nine-light single sash. With the windows properly placed, about one square foot of glass surface may be allowed for every sixteen square feet of floor area.

Inside Fittings.

The number of separate pens, and their size, will depend upon the size of the house or the number of fowls to be housed. The larger the pen the greater proportionate number of fowls can be kept in each pen. The smaller the pen the greater amount of labor necessitated in caring for the birds. A pen ten feet square will accommodate about thirty to thirty-five birds; a pen sixteen feet square will accommodate about one hundred birds. Practically no more labor would be necessary to care for the birds in the latter pen than the smaller number in the former pen. Chickens kept in small flocks will usually produce more eggs than when kept in large flocks, however.

The perches may be made of either one by two-inch sticks, well braced crosswise to prevent sagging, or two by three-inch pieces, with the two-inch side uppermost. The two top edges of the perches should be rounded off. About six to eight linear inches of perch room, according to the size of the fowl, is usually allowed for each bird. The perches should be as close to each other as the size of the fowls will permit. The lighter breeds will need only about twelve inches between each perch, while fifteen inches will be necessary for the heavier birds. All perches should be on the SAME LEVEL.

To keep the house sanitary, a platform should be built under the perches to catch the droppings. This platform, or dropping boards as it is ordinarily termed, should be tightly constructed of matched or ship lap boards. The platforms and perches are usually put at the rear of the pen to keep the birds farthest from the front of the building, free from draughts, and this also places the roosts where they will be least in the way. The platform should be about eight or ten inches below the bottoms of the roosts to permit of easy cleaning, without moving the perches. The edge of the dropping boards should extend about ten inches in front of the first perch, so as to afford room for the fowls to walk on when going to a desired place on a perch.

When building dropping boards, care should be taken not to make them too tight. The moisture of the droppings will make the boards swell, and if the boards are so tight there is no play at all they will buckle up and not only present a very poor appearance but will be very hard to clean thoroughly.

Where it is possible the roosts and dropping boards should be movable to facilitate the fighting of lice and mites. It is an excellent idea also to lower them as the weather gets warm. The closer the roosts are to the roof, in summer as well as in winter, the hotter will be the fowls. Not only does the sun warm the roof in the daytime, which in turn heats the air under it, this remaining warm far into the night, but the bodily heat thrown off by the fowls has less chance for escape when the roosts are close to the roof than when they are some distance away. If the fowls have the choice, it will be noticed that in summer they are content to take the lower roosts; in winter those nearest to the roof will be crowded, while the lower roosts are almost empty.

The nests may be placed under the dropping boards, above the floor, or on a specially built platform at one side of the coop; but they should never be stationary. They should be so that they can be easily taken out and thoroughly and frequently cleaned. Stationary nests mean a fine hiding-place for lice and mites. It is an excellent thing, after the nests have been cleaned (which should be done about twice a month), to burn the old nesting material and by putting the nest box right over the burning material for a few moments, a dense smoke can be made to permeate every corner and crack of the nesting box, and it is "sure death" to all vermin.

Fences and Yards.

The available space will govern the amount of runs or yards that can be given the fowls. The larger the yard the less danger there will be from contamination of the soil by the droppings of the birds. The smaller each individual yard the greater will be the restriction of the liberty of the hens, and the greater the proportionate cost of construction.

The fences can be of two-inch mesh wire for grown fowls. For little chicks, one-inch mesh is necessary, at least the first two feet up. For all ordinary purposes, two by four-inch posts of chestnut or hemlock, finished rough, and placed about two feet in the ground and not much over twelve feet apart, will sustain a six-foot fence. To preserve the life of these posts it is well to paint them where they go into the ground with a heavy coating of cheap tar paint. A baseboard of one by six-inch (cheap) boards, placed about two or three inches into the ground and nailed to the posts, will give a solid foundation on which to nail the lower edge of the wire, and will also prevent the fowls from scratching holes deep enough to get under from one run to another. It is a decided mistake to put boards along the tops of the posts, as the fowls will see these and fly up on them. A five-foot fence is usually high enough to pen in any of the heavy breeds, and six feet is sufficient for the lighter breeds.

CHAPTER V.

THE START—WHEN AND HOW MADE.

When sufficient quarters have been actually provided for the number of fowls that one desires to keep, the next step is to consider how and when the start will be made.

The advice that is given to beginners by all practical poultrymen, that is acknowledged to be safest and best to follow, is to begin with a SMALL NUMBER of fowls of GOOD STOCK. In beginning in a small way, one's ability and capacity for the necessary work increase with the enlarging of the plant. After one has done certain routine work, day after day, for a long time, this work becomes easier, and double the amount of work can be accomplished later on in half the time that it took at the beginning. And even more important than this is the fact that one's fund of practical knowledge and experience will increase as he works out the various problems as they present themselves.

Figuratively speaking, it is better to start with six chickens than with sixty. Some one may say: "Oh, six chickens; I could never waste time on so few!" But it is better to experiment with a few than with a large number, for one can get "closer" to the few; his experience will be just as great, if not greater, in caring for a small number than if one's energies are spread over a large number; one can see more easily and clearly both the good and bad effects of what has been done, and errors will be discovered and corrected much easier and quicker, hence with less loss, with a small flock than with a large one.

The amount of spare time one has to devote to his poultry would also control, to a large extent, the number of fowls kept. It is out of the question for the man who works from seven o'clock in the morning until six at night to be able to have as large a flock as the school principal, or teacher, who need not leave his house until almost nine o'clock in the morning, and who returns shortly after three in the afternoon, and also has all day Saturday in which to improve his flock and place. Then again, the person who is away all day long must leave his birds to the care of another, or, worse, to care for themselves, in which case the amount of attention they receive varies.

Where one's time is obviously limited, the progress must necessarily be slower, and this is often discouraging to those who desire to increase in a short time to a size that will permit them to leave their present position and make a regular business of keeping poultry. Progress in the poultry business is necessarily slow, unless one has unlimited funds with which to buy the labor of others, in which case the satisfaction of personal accomplishment is entirely lost. The man of average means must be contented to increase his plant largely from his own efforts, and his increase must be controlled by the amount of available time he has in which to work upon his plant.

A mistake that the beginner should be careful to avoid making is to figure that he would like to keep so many hens and think that this settles the matter. Do not forget that most important time of the year with poultry—the breeding season. While some experienced poultrymen can properly care for one thousand fowls (laying hens principally), it would be a physical impossibility for them to care for this number of fowls *plus* the hatching and rearing of sufficient chicks to replace the old fowls. During every breeding season, on all the large poultry plants, extra help is necessary. The practical poultryman who

can care for one thousand hens knows it takes three people to care for this number when the young stock is being raised, or during about four months of the year. Therefore, the novice would do well to figure that he would *like* to keep one hundred hens and then cut this to twenty, rather than to start with the larger number and find he must neglect both old and young stock during the following breeding season.

Good Foundation Stock.

One principal requisite for ultimate success with poultry is to start with GOOD FOUNDATION STOCK. Too much stress cannot be put upon the fact that *on this one point hinges innumerable vital reasons for success or failure*. One mistake some beginners make is to think that they can gain just as much experience with mongrel fowls as with pure-bred birds. This is not so. Mongrel fowls will take care of themselves, to a certain extent; and this very fact alone would be apt to inculcate a strain of neglect in the novice. And what is the use of spending a year or two breeding from poor stock (to get experience), when the entire flock will have to be discarded and a new, fresh start made with good stock? This would simply be so much time and labor wasted. And the experience one may gain from poor or mongrel stock will largely have to be discarded with the birds, and new methods learned with the better grade of fowls. Mongrels will return little more than trouble for one's pains. They are highly undesirable, unsatisfactory, and expensive in the long run.

It is better to buy and start with five fine birds at five dollars apiece than to begin with twenty-five poor birds at one dollar each! Fancy birds are not what is meant by good foundation stock, but this term includes birds that are full-blooded, true to type, and from the best laying strain that can be bought for the amount of money one has to spend. When such birds are used to breed from, the progeny will usually improve, and when one is ready to make a regular business of the pursuit, his birds will warrant and support the step.

There are two seasons of the year that are particularly favorable for the beginner to make a start in the poultry business; spring and fall. Spring offers many points of advantage, and fall also has its superiority in certain ways.

When one starts in the spring he will have the advantage of some months of warm, pleasant weather before him. This will be a valuable aid, as poultry always does better in warm, pleasant weather than when fighting the rigors of winter. Those who so desire can start in the spring with either young stock (chicks) or with grown stock—laying birds—or with some of both. In the fall, however, the start must invariably be made with grown birds. Whether one feels capable of attempting to master the two different branches of the business—that is, the chick branch and that of caring for the older birds—or whether he will tackle only the care of grown fowls in the fall and investigate the chick end of it the following spring, is something for the individual to decide according to his own feelings and his local conditions.

One can, of course, start in the spring with but one branch of stock, either chicks or grown fowls. It is usually considered best, when one desires to start keeping chickens in the spring of the year, to purchase first some grown fowls and try to learn how to care for these for a few months and then, if desirable, chicks can be either raised from one's own hens or purchased, and the details of this branch looked into.

The price of grown stock will be greater in the spring than in the fall. The person who has wintered the birds is justified in charging for this, and also for the fact that hens are ready in the spring to lay a large number of eggs. But this greater initial cost of the birds can be more than made up in the number of eggs that will be received and the chicks that can be hatched from these eggs.

If one purchases six yearling hens and a cockerel (and this will make an excellent mating), any time before the first of April, and hatches all the eggs received for the next three months, with fair success in hatching, he should have about one hundred and fifty or more chicks by July first. Even if some of these chicks are lost when raising them, and about all the cockerels are disposed of, one should have between forty and fifty pullets to show for his summer's work and to carry into the winter. And this is really a big stride for a beginner to make in such a short time.

A start made in the fall brings with it many opportunities for buying good stock at low prices. Large breeders are then planning for the winter housing of their birds, and they usually have some stock for sale. The current year's pullets must be housed, and these are usually put in the houses previously occupied by the older birds. No practical poultryman crowds two birds where one should go, hence some birds must be disposed of. This gives the person starting in the fall a chance to pick up some fine birds at reasonable prices.

Of course, the rigors of winter make it a fairly trying time for everyone interested in poultry. But if one can fight successfully through this period and master to some extent the details of proper feeding and housing of grown stock, he will be quite capable the following spring to continue and enlarge.

CHAPTER VI.

HATCHING THE CHICKS.

To make a success with chickens—that is, where they are not kept solely as a hobby, but where a net profit is expected—one must know something of the fundamental laws of reproduction in general, the formation and composition of eggs in particular, and also possess a certain knowledge of grains, as to their chemical analysis, feeding values, etc. There is something more to keeping chickens than throwing them some corn in the morning and gathering eggs (perhaps) in the evening. In other words, one must know chickens from start to finish, and back to the start again, to gain the greatest success. Let us observe a little more closely that very innocent-looking, yet most interesting object, an egg. To do so we will have to go back a little further, to the hen, and see how the egg is formed, of what it is composed, etc.

The Egg.

The ovary of the hen, or that part in which the miniature eggs are formed, when the hen is in laying condition or about to lay, looks very much like a bunch of grapes, with the exception that instead of being all one size, the eggs vary in size, according to their stage of

development, from about three quarters of an inch in diameter down to so small a size that they can be seen only with the aid of a microscope. During the period of laying, these eggs are gradually increasing in size in due succession. The yolk and germ, which go to make up these rudimentary eggs, are encased in a transparent sac which in turn is held to the ovary by a thin membrane. This containing sac becomes thinner as the yolk grows, and finally, when the yolk is mature, ruptures around the centre, and the yolk, surrounded by a thin membrane of its own, drops into the funnel-shaped beginning of the oviduct.

The oviduct is a passageway that in the normal hen is about two feet long, and its function is to carry the yolk and germ to the outside world, encasing them with a number of different coats on the way. The first coat deposited around the yolk and germ after they are received in the oviduct is what is generally termed the "white" of an egg, or the albumen, a secretion of the mucus membranes of the oviduct. This coat is not thrown around the egg all at once, but is deposited in layers as the yolk passes along. These layers may be readily distinguished if an egg is boiled hard, when they may be peeled off like the layers of an onion. A little farther along in the oviduct the egg receives another coat which is generally termed the "skin" of the egg, and lies just inside the outer shell. This skin is of two layers, and can be easily peeled apart; in fact, at the larger end of the egg one layer is a quarter of an inch or more away from the other layer, forming what is usually known as the "air cell" of the egg. The inner layer of this skin contracts, the air cell growing larger, as the egg grows older and moisture evaporates. When very rapid evaporation takes place, as in the case of eggs that have been incubated for eighteen days or so, this air cell may occupy as much as one-fifth of the entire space inside the shell. As the egg approaches the last part of the oviduct it receives another and final coat commonly known as the "shell." Here also the coloring-matter is deposited on the shell, certain breeds depositing a dark color solidly on a white ground, or perhaps only in spots, making the so-called "speckled" egg shells, and in still other varieties a coating of white is deposited over a buff ground—all governed by the various secreting organs of the different breeds.

Knowing these things, one can more readily see some of the wonderful provisions of Nature. The albumen is a poor conductor of heat, hence protects the egg, when hatching, from being suddenly chilled when the hen leaves her nest. It is "tough" enough to protect, to a large extent, the embryo germ from sudden jars or jolts. The albumen is also the principal nourishment of the growing chick in the shell, and in time is practically entirely absorbed by the chick, thus at the same time making room in the shell for the rapidly growing chick.

Nature has also so arranged the chemical properties of the outside shell that, considering its thickness and texture, when first laid, it is of remarkable strength, yet as hatching proceeds chemical changes take place in the shell itself so that the particles soften and partially disintegrate, permitting the shell to be much more easily broken, thus making it possible for the little chick to break its way through. Just before leaving the shell, the chick absorbs the yolk, and this is used as its nourishment for the forty-eight hours or so while the little chick is yet unable to procure proper or sufficient nourishment for itself. Truly as we study more closely the details of Nature's handicraft we marvel more and more at the wonders we discover.

The Hatching Period.

The hatching period is looked forward to each year with much eager expectation, and hopes of big results run high—sometimes approaching the altitude of air castles. But he who aims low seldom hits anything, and high ideals often accompany and frequently foster excellent results. But when the usual difficulties have been overcome—as they can be and have been by hundreds of people—and a goodly number of downy little puff-balls greet one at the end of the hatching period, he feels that the very careful attention given, largely superinduced by a natural anxiety, was well worth while.

Close care and attention, not only every day but all during each day and as far into the night as is possible, other things being equal, will help to bring off a maximum number of chicks. It will pay one well to look after things in the closest way during the three-weeks' period of hatching, and one's visit to the incubator or setting hen should not be made as seldom but as frequently as possible. This will enable one to "nip in the bud" any impending trouble before any serious damage can result. The loss of one of more hatches, especially if a large number of eggs are set, may make all the difference between a successful year's work and one bordering on failure.

Care should be taken in figuring the number of chicks desired, not to "bite off more than one can chew." Many have made costly mistakes by getting in over their head. It isn't the number of chicks hatched that one should look to, half as much as how many can be properly cared for, both as regards time and facilities, and how many can thus be raised to maturity. Instead of hatching more than can be cared for, resulting in poor care for all, figure on hatching half that number, and then give these the benefit of the best care and attention, and success will be more assured.

In regard to the size of incubator that the beginner will need, it is best for the individual to carefully estimate the number of chicks he expects to hatch the first or second season, and then buy a machine that will hold about double that number of eggs. For the majority of beginners, an incubator that holds either fifty or seventy eggs will be quite large enough. Unless one has a large amount of capital to invest in the business at the start, it would hardly be advisable for a beginner to buy larger than a 120-egg machine. This will hatch all the eggs that the novice will need to incubate at first. As the business grows, the number and size of the incubators can be increased.

As there are a host of different incubators on the market, all of which are differently constructed, it is quite impossible to give any set rules or instructions regarding their operation. Each manufacturer, however, knows his own machine best, and as all send minute instructions for operating their particular machine, it is safest and best to follow carefully the directions that accompany the machine when purchased.

Eggs that are intended for hatching should be set just as soon as possible. The longer any egg is kept the less valuable it becomes for incubating purposes. Evaporation of the moisture in the egg begins as soon as it is laid, carrying with it, also, certain material necessary to the growth of the chick. Eggs that are set the day they are laid will give the best results, though an egg may be kept a week or two and yet give satisfactory results. Chicks have been hatched from eggs kept from four to six weeks, but they were very hard to raise. Eggs used for hatching should be as nearly uniform in size, shape and color as possible, and the shells free from ridges or lines

around the middle, or at the small end of the egg. They should be carefully handled and not be jarred. When kept for a short time, the eggs should be laid on the side and turned only once every second or third day. They should be kept in a room where the temperature does not go below 45 nor above 55 degrees.

Hatching With Incubators.

The first week of incubation, like the first week of the chick's life, is the most crucial time. Extra care and attention during this period are not only in order but absolutely necessary to secure good results. When the eggs have been properly handled the first week, the worst may be considered over, and after two weeks of incubation they may receive fairly harsh treatment, yet will hatch satisfactorily. This, however, provides no rule, or even an excuse, for neglect, and the same careful attention given the first day or the first week should extend throughout the entire hatch.

The incubator should be thoroughly disinfected and run a few days before any eggs are trusted in it. The first week a temperature of 102 to 103 degrees should be maintained, care being taken not to exceed the latter figure. Beginning on the morning of the third (3rd) day, the eggs should be turned (not necessarily half-way round, but simply enough to change their relative position) twice each day, with as little airing the first week as possible. The second week, the temperature should be evenly maintained at 103 degrees. The eggs should be turned twice daily and cooled five minutes (inclusive of the time consumed in turning the eggs), when turning at night, where the room temperature is between 60 and 70 degrees. If the room temperature is less than 60 degrees, deduct from the five minutes one minute for every five degrees cooler. Thus, if the room temperature is 50 degrees it would allow but three minutes for turning and cooling. It is hardly advisable to incubate, especially during the crucial first week, where the room temperature runs much below 50 degrees. It would chill the eggs too severely when cooling and perhaps spoil the hatch. The third week the eggs are treated in a similar method to that employed during the second week, with the exception of an additional five minutes' cooling every night, making ten minutes' cooling instead of five, and running the temperature half a degree higher (103).

The seventh, twelfth and eighteenth days, the eggs should be tested, this being done best at night. Eggs that are perfectly clear are infertile, and those having a dark ring around the embryo (which during the first few days is generally floating freely) are imperfectly fertilized, and both of these should be discarded. If one is uncertain whether an egg is fertile or if the germ is still alive, it is best to leave it in the machine until the hatch is over. Experience is the best teacher in testing eggs. If the temperature has been maintained at an even degree and the eggs cooled properly, it is usually unnecessary to supply moisture in the machine.

At each testing time (on the seventh, twelfth and eighteenth days), the eggs should be cooled a full half-hour in a room where the temperature is about seventy degrees Fahrenheit. This excessive cooling causes the contents of the egg to contract, drawing in a large supply of oxygen through the porous shell.

Never under any circumstance should one egg be placed on top of another during incubation, making two layers. If this is done, the entire hatch will undoubtedly be a failure.

After testing the eggs on the eighteenth day and removing all those with dead germs, etc., the incubator should be closed and remain closed until the hatch is over. This does not mean that the temperature in the machine should be allowed to change appreciably, but regulation of the heat must be made from the outside by means of the lamp. Many hatches that might otherwise be successful are spoiled by opening the machine after the eighteenth day.

It is practically useless to try to assist chicks out of the shell. If a chick has insufficient vitality, from any cause whatever, to liberate itself from the shell, it will be unable to make proper growth, and sooner or later will sicken and die. It is true that it is hard to work for three weeks over the eggs and to see a chick pip the egg and then not to help it out, but such assistance will only cause endless trouble for those who permit sympathy or desire for a large hatch to run away with their common sense. Where it is possible to raise some of the chicks that are helped out of the shell, they will only lower the general vitality of the flock and never will make good layers or profitable birds. Besides this, the opening of the machine to assist a few weaklings out of the shell at the crucial time of hatching, will probably cool the temperature sufficiently to chill other chicks about to hatch, and this may result in the loss of large numbers of chicks that would otherwise have hatched.

The chick should begin to pip the shells about the end of the twentieth day, if the correct temperature has been maintained, and the hatch should be completely over by the end of the twenty-first day. The chicks should be permitted to stay in the incubator until they are thoroughly dried off and are strong enough to run around, when they may be safely removed to the brooder.

Beginners should not become discouraged if the first few hatches are not entirely successful. Poultrymen with years of experience do not always get big hatches. There are many causes for poor hatches. One of the principal reasons why experienced poultrymen advise beginners to start with good foundation stock is, because they know that the chances of getting fertile eggs that will hatch strong, liveable chicks are far better with good stock than with poor stock. Poor breeders seldom lay eggs that will hatch well. Thus the importance of getting the best foundation stock possible becomes very apparent in the reproduction of the flock. Improper feeding will affect the fertility and hatchability of the eggs. Too little green food given the breeders; improper care of eggs during the first week of hatching; too much cooling; too high or too low a temperature; jarring the eggs; eggs kept too long before being incubated; these, and many other similar reasons, cause poor hatches.

When a hatch has not been successful, the conditions should be carefully studied with a view to ascertaining the cause or causes, and these removed or corrected before attempting another hatch. With good breeding stock, properly fed and cared for, and correct incubation, the chicks will pop out at the proper time. If the beginner can get an average of seventy-five per cent. fertility and then is able to hatch fifty per cent. of the remaining fertile eggs, the first year, he will be doing very well indeed. Better results than these are, of course, possible and should be diligently sought. And with proper application and close attention to details, they will be achieved in time.

Hatching With Hens.

The best instructor in hatching with hens is experience. The local conditions vary so greatly, both with the operator and the hen, that only a few general rules and suggestions may be given.

The principal trouble with hatching hens is the possibility of their deserting their nests. This is usually caused by one of two things: Lice or a poor sitter. The first cause can easily be overcome. The hen should be thoroughly dusted with lice powder before she is given any eggs to hatch. This dusting should be repeated at least once a week (even after the hatch is off), until the chicks are almost weaned. The second cause may be overcome by a little experimenting. When a hen appears broody she should be placed on some china eggs for two or three days. If she still sticks close to the nest at the end of this time, it will usually be safe to place her on the eggs that are to be hatched. If Biddy persists in frequently leaving the nest to perch on top of the nest box, or tries to hatch a house by sitting on a door-knob in some other place, she will be an unreliable hen to trust with a batch of eggs.

A roomy box should be filled with nesting material and the hen should be changed to the new nest, preferably at night. The nest should be placed where other hens cannot annoy the sitter. It should be in a dry, comfortably warm place where there is not too much bright light. After the hen has been placed on the eggs, she should not be disturbed for about twenty-four to thirty-six hours. Then she should be carefully lifted off the nest and permitted to run around for a few minutes. Plenty of grain and fresh water should always be within easy reach of the sitting hen. During the first week, and to a certain extent throughout the entire hatching time, the attendant should remain near the hen when she is off the nest, to see that she goes back again within a reasonable time. A hen that sits too close is not as good a hatcher as one that is somewhat nervous and moves around in the nest frequently. The former will not allow sufficient air to get to the eggs to permit the growing chick to obtain enough oxygen to make proper growth. In such a case, the close sitter must be lifted off the nest more frequently and the eggs moved around gently to change their relative position.

Occasionally a hen will step on and break one or more eggs during the period of incubation. These should be removed as soon as noticed. If the nest has been badly soiled, new nesting material should be furnished. If any of the contents of a broken egg should get on the remaining eggs, it should be carefully wiped off with a cloth dampened with warm water. If a coating of egg is allowed to remain on the outside of an egg in the process of incubation, particularly during the second or third weeks, it will prevent the growing chick from getting sufficient air through the shell to hatch.

As the chicks begin to hatch, it is best to remove them from the nest and put them in a warm place where the temperature is about ninety-eight to one hundred degrees. If the chicks are left with the mother, as they begin to come off, the stronger ones will soon begin trying to get out of the nest. If one chick succeeds in getting outside, the hen will probably follow it, leaving the eggs in the nest, and these will be chilled and will not hatch. If the hen does not follow the chicks outside the box, they are likely to die from exposure. After all the chicks are hatched, the entire flock may be given back to the mother hen, which should previously have been given another thorough dusting with lice powder.

CHAPTER VII.

BROODING.

While the correct feeding of the chicks is one of the most important features of successful poultry raising, the brooding of the

chicks will either hinder or aid one materially in raising a large proportion of the chicks hatched.

There are two methods of brooding chicks: The natural way—with hens—and the modern method of supplying artificial heat. Both methods have their advantages and disadvantages. Some poultrymen think there is less work to brood the chicks under hens. Certainly, in the majority of cases, there is little or no trouble with the "heating apparatus." But there is a pecuniary loss, because the hen that is brooding chicks lays practically no eggs for about three or four weeks. This means about fifty cents loss. The hen, particularly if it is of a heavy breed, may clumsily step on and kill one or more chicks in the brood. Chicks which are brooded by hens are naturally more wild and are harder to tame, also feeling the restraint of winter quarters more than those raised by the artificial method.

When brooding chicks with artificial heat, there is, of course, the great danger of loss of both chicks and brooder by fire, but care should reduce this element to a minimum. While the equipment is necessarily more expensive, much larger flocks, both individually and collectively, can be raised by the artificial method than when brooding with hens. One can hatch and brood the chicks at any time of the year, and it is not necessary to await the pleasure of a broody hen. When the heat is properly supplied and the method of feeding is correct, just as many and just as strong chicks can be raised by the artificial method as by the natural way.

Brooding With Hens.

A mistake that is frequently made, when brooding with hens, is to combine the hatchings of two or more hens into one flock and give all the chicks to one hen to mother. Nature intended one hen to mother only the chicks she hatched, and these would never exceed a number which she could properly take care for. If one hatches only half a dozen chicks from each of two hatches, for instance, these might be combined and given to one hen to brood, while the other hen is put back into the laying pen, but it is unwise in the extreme to give twenty-five or more chicks to even a big hen to mother.

When the chicks are fully dried off and sufficiently strong to run around (usually about thirty-six to forty-eight hours after the hatching), they may be moved with the hen to the brooder coop. The brooder coop (two feet by two feet by two feet makes a good-sized coop) should previously have been placed in a dry location, preferably facing south, and protected from high winds and heavy rains. If the weather is cool, the coop should be placed where it will be in the sunshine a maximum part of the daytime, but in mid-summer shade must be provided. The bottom part of the coop, to a height of about three or four inches, should have earth banked against it to prevent draughts from blowing under, and to give good drainage. If the weather is excessively cold, the hen should be confined in a small box, placed inside the coop, and the chicks allowed to run inside the remainder of the coop. If pleasant, warm weather is present, the hen may be confined in the coop proper and the chicks should be given the privilege of running around outside. The clucking of the mother hen will prevent the chicks from straying too far.

The food for the chicks should be placed on a board in front of the coop for the first two or three days. This board should be where the hen can put her head through the slats in the front of the coop and eat, for she will then call the chicks and teach them how to eat.

Later the chicks should be fed farther from the coop, where their food will be inaccessible to the hen, as the food given the chicks is too expensive to feed to the hen continually. Plenty of grain should be provided for the hen, and fresh water in abundance should frequently be supplied to both the hen and chicks. When the chicks are weaned, numerous individual flocks may be assembled and placed in a colony coop.

The Artificial Method.

The suggestions for the placing of the brood coop for hen-mothered chicks apply equally well to the brooder coop in which the brooding is to be done by supplying artificial heat. The usual size of a lamp-heated brooder coop is three by six feet (though some indoor brooders are three by three feet). For convenience in operating a number of brooder coops, they should be placed as close as accessibility will permit, usually about two or three feet apart, and preferably in line with each other.

When the first eggs are set, the brooders should be overhauled and put in thorough working order. To leave this till the chicks are hatched may mean that parts which are missing or broken will have to be procured at the last moment. Inability to procure these parts at once may seriously prevent one from properly heating the brooder and caring for the chicks, resulting in the loss of some of the brood.

A day or two before the hatch comes off, the brooder should be made ready for the chicks. The floor should be covered to the depth of at least one-half inch with sand or loose, dry dirt, and about one-half inch of cut hay, clover or alfalfa should be placed over the sand. A little chick feed should be scattered over this, and two or three little piles should be put in the corners. After new wicks have been put in the lamps, they should be lighted. The flame should be regulated so as to maintain a uniform temperature of ninety-five (95) degrees under the hover, irrespective of the temperature of the air outside. Incidentally, the heat that is supplied in the hover should be supplied from the top downward—this is following the natural method of the hen. Most manufactured brooders are constructed so that the heat is supplied according to this principle.

When the chicks are placed under the hover, the temperature may go up to one hundred or one hundred and five degrees, but the lamp flame should not be altered. It is the natural bodily heat thrown off by the chicks that causes the temperature to rise, and the lamp heat should not be decreased on this account. Boards should be placed so as to keep the chicks within twelve inches of the hover for the first day or two, until they learn to go in and out from the hover.

The afternoon is the best time to place a new lot of chicks in the brooder. They should be fed and then gently put in under the hover where they should be kept for half an hour or so, when they may be permitted to come out and exercise. After the next feeding this operation should be repeated. A little chick should not be kept exercising too much the first day or two. Sleep is quite as essential at first to a chick as to a baby. After the chicks get the way of running in and out of the hover (usually in a day or two), it is no longer necessary for the attendant to see that they go back after feeding. The boards that kept the chicks near the hover may also be placed farther away from the hover gradually, and taken away entirely after one or two days.

At the beginning of the second week, the temperature may be lowered to ninety degrees, and to eighty-five the third week. This

temperature is gauged as at first, with no chicks under the hover. The comfort of the chicks should be the gauge by which the temperature of the hover is regulated. Chicks that are comfortable will put their little heads out of the fringe of the hover; if insufficient heat is being supplied, they will huddle together under the centre of the hover. The latter condition is to be avoided.

In clear weather the chicks should be let out on the ground after they are about one week old, even if the temperature outside is but forty or fifty degrees and the chicks are out only a few minutes. The chicks should be watched closely in cool weather, however. They should not be permitted to huddle, and as soon as they show signs of becoming cold, and huddling, they should be immediately put back into the brooder, under the hover. The chicks will enjoy this little run and look for it every day. In pleasant, warm weather the chicks may be allowed to run outside the brooder as they like, but they should never be permitted to go out in the snow or rain.

To successfully brood chicks, when supplying artificial heat, one must maintain a proper and uniform temperature under the hover. A place must also be provided where the chicks can get away from the heat to a cooler temperature—about seventy (70) degrees is correct—in which they can exercise. *Pure air* must be supplied the chicks *at all times*—under the hover and in the exercising pen.

It is hardly safe to put more than fifty to sixty chicks in the ordinary three by six-foot brooder coop. This allows about six-tenths of a cubic foot of air and four-tenths of a square foot of floor space per chick. Less than this will prevent one from doing the best with his chicks.

The brooder should be cleaned daily under the hover part and thoroughly once a week throughout. It should be disinfected by spraying with a solution of creolin and water or crude carbolic acid and water. The coops should be moved to new runs about once a month, and the old runs spaded up and planted to oats or rye to renew the ground.

Brooding Without Heat.

It is quite possible to brood chicks without supplying any heat to them whatsoever. Neither a hen nor a lamp is used to provide warmth for the chicks. The principle is to conserve the natural bodily heat that the chicks are constantly throwing off. This method has been proven of practical value in that it does not require a hen to be off the laying job for three or four weeks, and precludes any possibility of loss from fire.

The chicks are carefully watched to see that they do not huddle, and as soon as this tendency is noticed they are at once put into the fireless brooder. This brooder is made of an ordinary cheese box, or any other kind of a box that may be handy that is about sixteen inches square and five or six inches high. A square wooden frame is made to fit just inside the box, and unbleached muslin is tacked loosely on this frame. The muslin is tacked so that the centre falls about to the floor of the brooder when the frame is placed an inch down from the top of the box (where it is held in position by cleats). A "quilt" is made to cover the top of the box, and the heat inside the brooder is regulated by placing this quilt either snugly or loosely on top of the muslin frame. A three-inch square hole is cut in the side of the box through which the chicks can run in and out. When the chicks are cold they go inside the brooder and each chick helps warm the other.

This method of brooding may be used when the weather is moderately warm or when the chicks are few in number and brooded inside a house or coop. It requires a great deal of watching and "hand-nursing" at first to get the chicks into the way of going into the brooder to get warm, but when they once get the habit there is no more trouble with this than with any other system.

CHAPTER VIII.

FEEDING THE CHICKS.

One of the most interesting periods in the poultry keeper's yearly experience extends from the time the little chicks are hatched until they begin to feather out. Most hatching is done during the spring when everything seems to be taking on new life, and one's spirits are simply bubbling over with exuberance. One's expectations seem to grow daily as the three weeks' period of incubation gradually draws to a close, and it is an exciting time indeed when the little chicks begin to "pop out."

The little downy puff-balls seem to "sit up and take notice" almost as soon as they are dried off. They instinctively begin picking at everything within the limited range of their sight. In the absence of, anything more inviting they pick at each other's bills and toes, and woe be to the chick so unfortunate as to have the blood drawn. It is this instinctive picking that holds much danger for the beginner. When he sees the little fellows picking at each other, at the felt, even at little specks on the glass of the incubator, etc., etc., the novice immediately concludes the chicks are hungry. Forthwith he takes them out of the incubator, puts them into a brooder, and promptly begins stuffing them with all they will eat. In reality, he is banking up trouble for himself in direct proportion to the amount he gives the chicks to eat.

Nature has provided little chicks with proper food in sufficient quantity to last them for sixty to seventy-two hours after they leave the shell. The last thing a chick does before breaking through the shell is to absorb the yolk of the egg, and this becomes its food until it is sufficiently strong to gain its own livelihood. Not only is the chick abundantly supplied, but if other food is eaten before this yolk is assimilated trouble will invariably result. It is like a man who has just eaten a big, hearty dinner and then is forced to eat a lot more, only the effects on a tender little chick are more far-reaching and disastrous than in the case of the man. Feeding chicks too soon after they are hatched is one of the principal causes of the high death rate, and large financial loss, in the chicken business.

The kind and quality of chick food that is fed little chicks must of necessity depend largely on local conditions. There are many mixed chick grains on the market, and, if the truth were told, but few are of inferior quality.

The one point on which half the success of raising chicks depends is feeding only *sound, sweet grain* that has not been "heated" and that is free from mould or mustiness. Poor grain will not afford sufficient nourishment for the chicks, and sour grain will very quickly upset the sensitive digestive apparatus, resulting in sickness and final loss.

Method of Feeding for the First Two Weeks.

The first day the chicks should first be given a little grit (smallest size), fed sparingly, so that the chicks' crops will be induced to begin their natural working functions and thus be ready to take care of the

food when it is received. The grit may be put before the chicks first on a board so it can readily be seen, and later should be kept in hoppers, accessible at all times. About three times a day the chicks are given a mash, composed of hard-boiled eggs cut up fine, mixed with dried bread crumbs, and slightly moistened with sweet milk, not mushy, but just so that when a handful is taken up and squeezed in the hand and permitted to fall it will crumble away in pieces. Tapping with the fingers on the board holding the food will attract the attention of the chicks, and their curiosity, spurred on by their appetites, will quickly induce them to eat. The mash is left before the chicks about five minutes at each feeding, after which it should be *entirely removed*.

The bread and egg mash is made by boiling (infertile) eggs hard for about thirty minutes and chopping these up *fine*, shell and all. Bread should be cut into slices and slowly dried in an oven for at least an hour or more until it is brittle, and then crumbled very fine. One dozen eggs is sufficient to mix with two loaves of bread. This mixture should be made for a day's feeding only, as it will quickly sour.

Wheat bran may also be given from the first, as it is a "bulky" food and balances the more concentrated food of the mash. It is surprising, after the chicks get a good taste of the bran, with what relish and in what quantities they will consume it. It is perfectly safe to permit chickens of any and all ages to help themselves to bran, as they cannot consume too much for their good.

From the very first the following chick mash is put before the chicks DRY, in shallow trays, and the chicks are allowed to eat as much as they desire. After a few days or a week, the mash may be fed in hoppers, and always kept accessible. This mash is given the chickens dry continually until the fowls approach maturity, when the laying mash is gradually substituted.

A Chick Mash.

- 20 lbs. Corn Meal.
- 20 lbs. Wheat Bran.
- 20 lbs. Wheat Middlings.
- 20 lbs. Fine Beef Scraps (best quality).
- 8 lbs. Fine Bone Meal.

After the chicks are one week old, add 2 lbs. fine charcoal.

The first day a little commercial chick feed is placed on a board before the chicks until they become used to picking it up and eating it, and then a handful or so is fed in between the times the egg mash is fed, in the litter, to make the little fellows scratch for a living, thus keeping them in fine, healthy condition. A little rolled oats may be given occasionally to vary the ration. Fresh water, or half water and half sweet milk (lukewarm), should be given the chicks from the beginning of the *second* day. Giving water too soon after hatching may bring on diarrhoea and other bowel troubles. The chicks can easily be taught to drink by dipping their bills in the water a few times.

A Daily Schedule for Feeding the Chicks.

Ordinarily, about three teaspoonfuls of the egg and bread crumb mash will be sufficient for about fifteen or twenty chicks, at each feeding. About one and a half teaspoonfuls of water should be sufficient to use in moistening this quantity of mash. If milk can be obtained at

a reasonable price (skim milk is quite as good as clear milk), this may be mixed with the water and given the chicks. Milk is better than water to use in moistening the bread-and-egg-crumbs mash.

The following is a practical schedule for the daily feeding of chicks for the first few days or a week:

Proportions for about 20 chicks:

7 A. M. (or as soon as light).—Lukewarm water (with one-quarter to one-half milk).

8 A. M.—Small handful commercial chick feed, scattered around.

10 A. M.—Three (3) teaspoonfuls of bread crumbs and egg, *slightly* moistened.

12 M.—Fresh lukewarm water (and milk). Small handful of grain scattered around.

2 P. M.—Three teaspoonfuls of bread crumbs and egg, *slightly* moistened.

3:30 P. M.—Fresh lukewarm water (and milk). A generous supply of grain, scattered around, so that the chicks can have *all* they want. Ordinarily, about two handfuls is sufficient.

4:15 P. M.—*All* the bread crumbs and egg, *slightly* moistened, the chicks will eat.

This last feeding of bread crumbs may be left before the chicks for twenty minutes or so. About five or six teaspoonfuls will be sufficient. DRY CHICK MASH BEFORE THE CHICKS AT ALL TIMES.

The bread crumbs and egg should be before the chicks at the 10 A. M. and 2 P. M. feedings, not more than FIVE minutes at each feeding—then it should be removed.

If there is any grain to speak of in the litter, which the chicks have not scratched out from the previous feeding, do not give them any at the next feeding, but skip a feeding.

The greatest secret in raising a large proportion of the chicks hatched is to feed the proper kind of food, *without overfeeding!* Keep the chicks a *little hungry* during the day. They should come forward for the next feeding with some appetite. The chicks should be filled up at the *last two* feedings only. DON'T OVERFEED—DON'T OVERFEED!

This feeding is continued as outlined until the fifth day, when a little green food, such as lettuce, sprouted oats, or very young grass, cut in quarter-inch lengths, is added to the ration and fed freely every day. Without a large supply of green food, the chicks will not make proper growth. Very fine charcoal should also be given at this time and kept before the chickens all during their lives. Charcoal may be considered the chickens' "medicine chest"—if kept before them at all times, they will be their own doctors to a large extent, and they will take this wonderful corrective medicine in sufficient quantities and at the proper times to keep themselves in good condition.

The sixth day a dish or hopper of very fine beef scraps should be put before the chicks and kept accessible at all times. After ten days or two weeks the egg and bread crumb mash may be omitted, a growing mash gradually being substituted. As the chicks develop, larger sized grains may be given in preference to the very fine chick feed.

Method of Feeding the Chicks from Two to Four Weeks.

At the end of two weeks the chicks should be fed less, both in the number of feedings and in the quantity given at each feeding.

The chick feed should be scattered in the litter only *twice* daily, at 9 A. M. and 4 P. M. The morning feeding should be light and scattered well into an inch or more of litter, thus keeping the chicks *active* and a trifle hungry early in the day. The 4 P. M. feeding may be heavy, to fill the chicks up for the night. Give *plenty* of succulent green food. Discontinue the milk in the water, and give lukewarm water only, three times daily.

The bread crumbs and egg should be gradually discontinued toward the end of the second week, and the chick mash used in place. This can be easily done by introducing a little of the chick mash with the egg and bread crumbs about the tenth day, and gradually increasing the quantity of chick mash and decreasing the egg and bread crumbs, until only chick mash is fed at the end of two weeks. This mixture should be *slightly* moistened, the same as the egg and bread crumbs were. Two feedings a day are enough for the mash—at about 12 M. and 5 P. M. Keep the chick mash *dry* before the chicks at *all* times.

It will be noticed, according to the schedule, that grain is always fed for the chicks to fill up on at night, *before* the moistened mash. This is so that the chicks will be induced to eat as much grain as possible, as this will remain in the crop longer than the soft mash food. Then again the chicks will eat their crops nearly full of grain but relish the egg and bread crumbs so well that later they will eat more of this, when, if things were reversed, they would not touch grain after having eaten their fill of soft food.

This second schedule of feeding should be continued for the two weeks following (or until the chicks are about four weeks old). Further schedules for feeding the chicks will be found in the chapter on "Growing the Young Stock."

Plenty of exercise, plenty of green food, dry mash, and charcoal, with judicious feeding, should raise a large proportion of the chicks hatched. Common sense should play a prominent part in the brooding and raising of chicks, and he who looks not at the labors of the moment but rather at the results that will become apparent six months later, will get closest to success in the long run.

CHAPTER IX.

HOW TO PREVENT CHICK MORTALITY.

There is a loss of millions of chicks annually, and a large proportion of these chicks could be raised if proper conditions were in evidence. There are two or three things which are the principal causes for this terrible loss, but there are usually attending causes that lend aid in making this appalling death rate.

To be able to prevent chicks from dying, one must know the principal reasons why chicks become sickly and die. Knowing the causes, one can more intelligently provide a means of prevention.

One of the most far-reaching causes of chick mortality is the condition of the breeding stock. By condition is meant the entire matter of the quality of the stock; its care and feeding. In the hatching and rearing of the chicks, the quality of the breeding stock, and the care and feed it receives, will become very apparent. One cannot be too particular about the breeding stock. While it is very nice to be able to procure a male bird from a flock of 200 egg-layers, if he does not possess the best of health and vitality he is worse than useless as a

breeder. And the same applies equally well to the females in the breeding pen. Healthy birds are of the greatest importance to the poultryman who is in the business to stay. Without healthy breeders, the general flock will deteriorate in vitality, and that means the beginning of the end. More complete details of the breeders and their care will be found in a subsequent chapter.

A lack of care in the selection of eggs kept for hatching will cause, to a large extent, chick mortality. Eggs that have been kept too long will not have sufficient nourishment remaining in them when set to furnish the chicks with proper nutrients to sustain life. The eggs may have been kept in too warm a room, or may have been roughly handled.

One cause of chick mortality may be found in faulty incubation. Chicks may be hatched that seem all right, but they will die after a few days from apparently no cause whatsoever. If the heat in the incubator has been either too high or too low, it will seriously interfere with the proper growth of the chick while in the shell, and this will become apparent after the chick hatches. When the heat is run too high for an extended time, the yolk of the egg will probably be baked, sometimes until it is as hard as that of a hard-boiled egg. When a yolk is in this condition it cannot be assimilated by the chick, which means that the chick will live for a while but will ultimately die.

Errors in brooding are frequently the cause of chick mortality. To crowd too many chicks into a brooder will prevent all from getting proper nourishment and exercise, and dead chicks under the hovers will be the result. One cannot put more chicks in a given space than should properly go there, any more than one can put a quart into a pint jug. The manner of supplying the heat may cause the chicks to die. If the heat is supplied from underneath, instead of from the top downward, the chicks will get "weak legs" and this will kill a great many.

If insufficient heat is supplied in the brooder, the chicks will huddle together to get warm. To keep from being trampled upon, they will have to stand, and no chick can sleep while standing. A chick that does not get proper sleep will not grow. Or the lamp in the brooder may go out some windy night, and the chicks will become chilled, which will probably so lower their vitality that they will be unable to overcome the handicap.

Impure air in the brooder or under the hover will not afford sufficient oxygen for the growing chick. Chickens of all ages are rapid-breathing fowls, and must be supplied with a sufficient quantity of pure air to enable them to live. If the fumes of the brooder lamp are allowed to seep into the hover or brooder proper, or if the brooder coop does not have sufficient ventilation to admit a good supply of fresh air at all times, the chicks will suffer in consequence. A lack of sunlight will kill chicks almost as quickly as improper feeding or breeding. It is impossible to raise chicks in a cellar or anywhere below ground, where no sunlight penetrates. In summer, however, too much sunlight makes the coop (and chicks) too hot, and mortality will ensue. Shade positively must be provided in summer for fowls of all ages.

A very prominent cause of chick mortality is unclean coops. This applies especially to very young chicks, but it is also applicable to chicks that may even be over the more dangerous stages of their growth. Unclean coops will work havoc in the best flock in the land. The droppings of chicks quickly become foul, and many diseases (particularly that most dreaded chick disease, white diarrhoea) are spread to healthy chicks by their coming into contact with infected droppings in unclean coops. Clean the brooders underneath the hovers EVERY DAY, and thoroughly clean the entire brooder at least once a week. Disinfect the brooders frequently with a solution of creolin (one pint)

and water (thirty-two quarts). A plentiful supply of sand on the floor of the brooder will aid in absorbing the droppings during the week, and will also prevent disease.

Chickens are more susceptible to dampness than they are to cold. If a brooder is placed in a hollow, where the water will remain under or around it, the chicks will soon show the ill-effects of this lack of precaution. The roof or cover of the brooders should be absolutely rainproof. If a brooder should become wet from any cause, the chicks should be removed to another dry brooder.

Improper feeding probably does as much as, if not more than, all else to increase the death rate of chicks under two weeks of age. To this one cause may be attributed at least one-half the failures in the poultry business. It may be that the chicks are fed too soon; they may be fed too much, either at one time or in the aggregate; insufficient exercise may be afforded the chicks in procuring the grain, thus allowing them to get too much food too easily; too much of either soft food or of grain, *i.e.*, an unbalanced ration; the mash food fed too wet—these and many other similar causes, in connection with feeding, reduce the percentage of chicks that are raised. A healthy chick hatched from an egg laid by good breeding stock in excellent condition can have its vitality sapped and really be killed by improper feeding in a very short space of time. Incidentally, the contrary is also true. Chicks that are somewhat weak at first, with proper care and feeding can be built up until their vitality is practically normal. It all depends on the quality, kind and proportions of feed given, and the method of feeding.

Knowing the causes of chick mortality, one should do his best to keep his chicks from dying by preventing their getting sick. To keep the chicks well, change or remove entirely and at once all conditions that lean toward any cause or causes that might bring on chick mortality. This is the secret of preventing chick mortality. It seems simple when learned from those who have "been through the mill," but it is an expensive lesson, costing much valuable time and money and labor, if one has to learn it by sad experience. *An ounce of prevention is worth tons of cure!*

White Diarrhoea.

During the past few years scientists, medical authorities, and practical poultrymen have all been trying to ascertain the specific cause of white diarrhoea. So far, some valuable progress has been made, but much more has yet to be learned regarding the strange malady that is dreaded so much by all poultrymen. While the deaths of numberless chicks are attributed to white diarrhoea, it is a question in the minds of those who have studied this disease whether white diarrhoea is the actual cause of the chicks' death or only an accompanying symptom that materially aids with other causes in reducing the vitality of the chick until it dies. It is generally acknowledged, however, that there are certain fundamental causes for the deaths of chicks, and these same causes will also foster the disease known as white diarrhoea.

In a word, the causes that have been given in the early part of this chapter will cause chick mortality, and at the same time white diarrhoea will undoubtedly be in evidence.

There are several specific causes of white diarrhoea, as follow: The condition of the breeding stock; a lack of care in the selection of hatching eggs, in their handling and the time they are kept; faulty incubation and brooding, and incorrect feeding and care of the chicks, particularly at first.

In this disease, as with general chick mortality, the treatment should be one of prevention, based on a knowledge of the causes of the disease. See that only thoroughly matured, healthy breeding stock is used to supply the hatching eggs. Do not hatch eggs that have been laid by very young pullets, nor should immature cockerels be used to head the breeding pens. Hens that are to be used in the breeding pens should not be forced for a maximum egg production. If they have been so forced, the best of their strength has been used up, and they cannot lay eggs that will hatch strong, livable chicks. Unsound breeding stock will bring on white diarrhoea in the chicks that will take off half a flock in a week.

Enough has been said in previous chapters about the care of hatching eggs, the methods of incubation and brooding, and proper formulas given for the feeding of the chicks, to give even the beginner sufficient knowledge to enable him to prevent conditions that will be apt to start or spread general disease, or white diarrhoea, in his flock. The poultryman should be ever on the lookout for the *first symptoms* of any trouble, and as soon as exceptional conditions are noticed the cause or causes should be ascertained and at once removed. *An ounce of prevention is worth tons of cure!*

CHAPTER X.

GROWING THE YOUNG STOCK.

A chick that is properly handled the first ten days of its life may be considered one-quarter raised. After the chick is three weeks old, it is practically half raised, and when it reaches the age of six weeks it may be pretty roughly treated, yet will live and grow. It is as hard to kill a chicken over six weeks of age by injudicious feeding or poor care as it is easy the first ten days of its life.

From the time a chick is two weeks old until it reaches the age of six weeks, care should be used not to give it food that will make flesh. During this period chicks will take on flesh rapidly, and the result will be too heavy a body for the amount of bone and tissue. This causes indigestion also, and the chick gets "weak legs." If the food is not then changed, the chick will soon die. With a properly balanced ration for the chicks at this period, they will make a fair growth without any trouble.

As has been said before, the chick mash should be kept before the chicks at all times. The moist mash should be given the chicks ONCE a day only during this period, preferably at noon. The first feeding early in the morning should be chick food, well scattered in at least one inch of litter. The chicks should be made to work for all the grain they get in the morning. At night a more generous supply of grain may be fed—in the litter, of course. The quantity of grain to be fed morning and night will depend entirely on the condition of the chicks and the quantity they consume readily. At the night feeding the chicks should get all they want and go to bed satisfied, leaving just a *little* grain in the litter. This they will dig for early in the morning before the attendant comes around. About half the quantity that is given at night will suffice for the morning feeding, but one must use his judgment in this matter.

Chicks should be held back in their development for the first six weeks, but from then until maturity they cannot be pushed too hard.

When the chick passes the age of six weeks, its entire nature changes. All the food then goes to build up the frame, hence a chick will stand very heavy feeding without adding much flesh. The chicks also show, at this time, that they are becoming tired of the chick feed, and a change is necessary. The following developing food may be fed morning and night in litter, or may be hopper-fed, if necessary. A certain amount of exercise will materially aid the proper growth of young birds, hence the feeding of the grain in litter is preferable.

Developing Food.

	LBS.
Cracked Corn	50
Wheat	30
Kaffir Corn	10
Millet	2
Buckwheat	2

The developing food is rich in carbohydrates also, but young growing birds can stand more heat-producing elements. It is fed when the fowls begin to show the preference for larger grain than the chick feed (at about the age of five or six weeks)—making the change *gradually*. This can be done by introducing this feed with the chick feed and gradually increasing the quantity of the developing food and decreasing the amount of chick feed, until all developing food is being fed. An abundance of green food (either lawn clippings or sprouted oats) should be fed twice every day.

This method of feeding is continued until the birds become about four to four and a half months old, when the scratching food mixture and laying mash are *gradually* substituted.

Separating the Sexes.

As soon as the sexes can be detected, they should be separated. In the light breeds the cockerels begin to develop their combs and wattles, and these become red very rapidly when the birds are about six or seven weeks of age. The heavy breeds are somewhat slower in developing these distinguishing marks. Just as soon as one is reasonably sure, however, the pullets should be placed in colony coops, and, if possible, given free range on a grass lot. If one has not sufficient room to give the pullets unlimited range, they should be afforded as much roaming space as is possible, and grass must be supplied them in abundance.

After the cockerels have been separated, one should continually be on the lookout for poor specimens and those that have glaring defects, such as crooked tails, hump backs, poor general shape, etc., etc. The best-shaped, best-developed male birds should be put in a separate pen and kept for breeders, and the culls fattened for broilers and killed as soon as they reach about two pounds in weight.

To fatten broilers they should be fed all they will eat up clean of a grain mixture in the morning. This mixture is composed of two-thirds cracked corn and one-third wheat. The grain should be given on the floor or ground, where there is no litter, as cockerels should be made to exercise and move around as little as possible. At noon they should be fed all they will eat of a moistened mash mixture. This

mixture is made similar to the chick mash mixture (formula for which is given in the chapter, "Feeding the Chicks"), with the exception that the quantity of cornmeal is doubled. At night they are fed another liberal feeding of grain, same as in the morning feed. Green food is given twice a day.

All pullets that do not measure up to a certain standard of appearance, size and general good health should be placed by themselves and given special care and food. Certain birds are occasionally kept back in their development by being picked on by some of the larger and stronger birds in the flock, and thus are unable to get sufficient food for proper growth. These birds, if separated from their antagonists, and given a little extra care and attention, plus sufficient nourishing food, will frequently make a remarkable gain, and it will not be long before they are again on a par with their fellows and can be returned to their original pens.

Pullets of different ages should not be put together or they will not do well. The older ones will pick on the younger ones and otherwise seriously annoy and worry them.

Neither cockerels nor pullets should be permitted to roost until they are put into the laying house (at about the age of five or six months). Early roosting will result in crooked breast bones.

Providing Shade.

While shade is of prime importance to chickens of all ages, it is a positive necessity to little chicks and young stock. There is nothing so debilitating and enervating to a little chicken as an excess of heat.

The runs, if there are any, should be so arranged as to include whatever natural shade there may be. Shrubby and small, low-hanging trees make excellent shade because of their close proximity to the ground. Where these are absent, however, one might plant some fruit trees, particularly plum, apple and peach. These grow quickly, and will make especially rapid growth owing to the great amount of nourishment derived from the droppings of the chickens.

An excellent method of providing artificial shade for chicks is to grow oats or rye in the runs. They should be sown the fall previous to the spring when their shade will be needed, but up-to-date, successful poultrymen are always planning from six months to a year ahead. Rye and oats grow to a fair height and may be sown so thick that it makes a most excellent shade. The young chicks take great delight in running in and out amongst the stalks of grain, and at the same time they have the advantage of getting excellent exercise in the shade on cool ground.

Sunflowers make good shade, grow quickly, and at the same time yield an actual return in the seed, which, when fully ripened, may be fed in moderate quantities with excellent results, especially during molting time. Grape vines also make excellent shade which quickly becomes available. Both sunflowers and grape vines should be planted outside the runs, if one does not want the chickens to harvest the crops.

In small coops that are in the sun most of the day, the temperature may be lowered considerably by stretching a piece of muslin or other light-colored material over it, leaving a four to six-inch air space between the muslin and the top of the coop. This muslin serves the double purpose of reflecting back the heat and permitting the hot air underneath it to rise out through it, while the air space prevents to a great extent the outside heat and the direct rays of the sun from beating directly upon and into the coop.

CHAPTER XI.

SCIENTIFIC FEEDING FOR EGGS.

Though the egg yield of different breeds of poultry varies, no matter what particular variety one may choose, every one who keeps chickens on a commercial basis desires a maximum egg yield. By a commercial basis, the writer means every flock of chickens except those kept solely and purely as a "hobby." Whether it be just a few fowls on a farm or city lot, kept primarily to supply eggs and meat for one's own table, or a large plant from which a monetary return, or perhaps even a living, is expected by the owner, eggs must be gotten or failure will inevitably result.

For the poultryman in business primarily to supply fresh eggs for market and eating purposes, a large egg yield is an actual necessity. The reason a number of poultry plants fail is because they have a flock of ordinary egg producers, and the margin between the high cost of feed and the moderate egg yield is not sufficient to leave a livable profit after other necessary expenses are deducted. The difference between the hens of one flock that averages 120 eggs a year, and those of another flock which averages 180 eggs per annum, constitutes the difference between hens that "don't pay," and a flock of profitable chickens. The cream of profit on a poultry plant, which supplies eggs for table use primarily, is gotten from the hens that lay above 144 eggs every year.

That the quality, quantity and method of feeding controls the egg yield to a large extent is acknowledged by all practical poultrymen. And that no single, definite rule of feeding can be given for all flocks is equally agreed to by all who keep chickens. Each individual flock is a unit in itself, and requires certain treatment to obtain the best results.

While no method should be followed in its entirety, there are certain *fundamental laws* and rules regarding egg production that must be observed if maximum results are to be had. Ignorance of these laws of nature, or indifference thereto, resulting in neglect, will insure poor results in general, if it does not entirely foster failure.

To get eggs from hens we must attend to the details of supplying all the elements that are needed by the hen in producing an egg. In the first place, before man undertook to increase the laying qualities of a hen from about 50 eggs a year to 200 or 250, the making of an egg as Nature planned was simply and solely an act of reproduction. Nature decreed that spring and early summer should be the time this should be accomplished, for many reasons. One reason was that animal and vegetable life (*i.e.*, the sustenance of the hen) is most plentiful, and in its most succulent form, at this time of the year. Thus a hen could easily get the kind of food, and plenty of it, that this extra duty entailed. Man has been able to extend this period of reproduction from a few to almost the entire twelve months of each year. To do so, however, it was necessary to observe the "rules of the game" as closely as possible.

Eggs are without doubt a court of last resort for the surplus energy of the hen. Whatever food a hen consumes necessarily goes to sustain life first—*i.e.*, to repair and replace the tissues and other parts of the body that are constantly being used up; to furnish bodily warmth, and to store up a certain amount of surplus fat, to be used in time of special need. It is only after the normal bodily needs are fully supplied that any remaining energy can be put to other use. Aside from the normal maternal instinct, the egg production will be small or large in direct proportion to the amount of surplus energy a hen can create.

When we look at an egg as an act of reproduction, possible through the hen possessing a certain amount of surplus energy, we immediately see the great importance of proper feeding. It is quite out of the question to pursue a haphazard method of feeding and obtain good results. To feed the proper amount of the different grains, one must naturally first know their chemical composition and nutritive values. Possessing this knowledge, we are enabled to combine the various grains, in proper quantities, to obtain what is commonly known as a "balanced ration." Such a ration will give the hen all the kinds of feed, in proper proportions, to make eggs. When all other factors, such as proper housing, ventilation, cleanliness, etc., are favorable, a maximum egg yield should be the inevitable result.

The Chemical Composition of Grains.

While the elements that go to make the chemical composition of all grains are the same, one grain differs from another insofar as these elements differ in proportion. Briefly, the elements in all grains are as follows: The carbo-hydrates, which are the fats, oils, sugars and starches; protein, an albuminous substance found largely in the white of an egg; ash and mineral matter, which is chiefly what is left after the combustible part of the feeding stuff is burned away; water, which is present in all grains, being about 10 per cent. of the body of the grain.

The carbo-hydrates go largely to form the fats which are burned or stored in the body. This element is turned into bodily heat and energy much the same as coal that is burned in a stove, under a boiler, goes to make warmth and energy, the latter in the form of steam. A hen that is in laying condition should have a little surplus fat in her body. This shows that the system is plentifully supplied with carbo-hydrates, and there is also some to spare. The first part of the egg to be formed is the yolk, which consists of about one-third fat and two-thirds protein. The necessity of a surplus of egg-forming matter in the hen's system is, therefore, apparent. It would be a great mistake, however, to think that by simply increasing the carbo-hydrates one will get more eggs. On the contrary, this would only result in the hen soon becoming overfat. When in such condition, the tissues are weak and flabby and are not strong enough to perform the function of egg-making. While an underfed hen cannot lay, an overfat one is in little better condition.

The element of protein is used to form muscle, to build up the body, and in egg production. In running around, scratching for food, etc., every hen uses up certain tissues which must be replaced or rebuilt. Protein furnishes this most important element, and without it a fowl would practically waste away, and could live but a short while. An excess of protein is not a "sure egg producer," however. While a hen is able to adjust her digestive organs to a certain extent to an excess of protein, in the absence of sufficient carbo-hydrates, the kidneys and liver are unduly taxed in an effort to work off the large amount of nitrogen in the former element. Such a method of forcing egg production would also be quite expensive, as protein is a more costly fuel than carbo-hydrates.

Not all the ash and mineral matter taken by the hen is used. A large proportion, however, is used in making the bones of the fowl, and in making egg shells, while the remainder is thrown off as refuse. All the ash matter a hen needs in a year cannot be supplied through the quantity of this element in the different grains. A hen that lays

150 eggs a year will use in this production alone about one pound and a half of mineral matter. Only about half a pound can be procured from the ash contained in the different grains, which leaves about a pound to be obtained from some other source. This is generally supplied by keeping oyster shell or mortar (both rich in lime) before the hens all the time, in which case the hen will take care of the balancing of this part of the ration herself.

From this survey of the situation one can easily see the importance—nay, absolute necessity—of giving the hens the proper proportions of the elements needed, if a big egg yield is desired. Hens that are keeping their bodies in the “pink of condition,” and at the same time are making eggs (sometimes one a day), are working at topnotch speed, as it were. Such results cannot be obtained if a limited or improper variety of fuel is given.

In the first place, no matter what food is fed, it should be sound and sweet. Poor grain will give poor results, regardless of how it may be fed and in what proportions. To give hens corn that has been or is heated or moldy; to feed so-called “chicken-wheat,” which is nothing more than burnt grain that is good for nothing, but is sometimes thought good enough for poultry; to feed sweepings just because they cost a few cents a hundred less; to feed any kind of grain, in fact, that is not perfectly sound and sweet and wholesome, and of the best grade or quality, simply means that the hens receiving such feed will be an ordinary flock of fowls “that don’t pay.” It is not the fault of the hens half as much as it is the fault of the owner if they don’t pay. He who stints on the grain bill by feeding poor grain, or too little, is a perfect example of the “penny wise and pound foolish” type.

Balanced Rations.

It is undoubtedly necessary to feed a variety to get good results, but to get a maximum egg yield the different grains that are fed must be given in proper proportions. A feed containing the proper proportion of all the necessary nutrients is a “balanced ration.”

From experiments it has been found that the nutrients a hen requires are approximately as follows: Protein, 10 per cent.; carbohydrates, 42 per cent.; ash, 2 per cent.; dry matter, 45 to 50 per cent. From this table we see that the protein (10 per cent.) in comparison with the carbohydrates (42 per cent.) has a ratio of 1 to 4 (or, as it is generally written, 1:4). This is undoubtedly the best (and proper) ratio for egg production. Corn analyzes as follows: Protein, 7.9 per cent.; carbohydrates, 76.4 per cent. This is a ratio of almost 1:10—far from the ideal egg ratio. A glance at this tells why it is futile to expect to get a maximum egg yield by feeding corn alone.

While the ratio of 1:4 is right for an egg ration, there are other rations, for instance: A growing ration for young stock; a maintenance ration—that is, enough for life; a fattening ration, such as is used for fattening fowls for market. All these rations are somewhat similar, the changes being made according to the results desired. Many persons use corn meal to fatten birds, but, if asked why, would probably be unable to give a satisfactory reason. A glance at the analysis of corn meal makes the matter clear at once: Protein, 6.3 per cent.; carbohydrates, 73.2 per cent.—a ratio of 1:11. Thus, for fattening fowls we use a ration weaker in protein and richer in carbohydrates—the fat-forming element.

By long and continued experimenting, in time one might be able to find a ration that would be satisfactory, but few of us have time or money to spend in trying such experiments. On the contrary, with but an elementary knowledge of the science of feeding, and a table of analyses of the different grains, one can sit down and with little difficulty formulate rations with certainty as to their theoretical value, and with reasonable anticipation of achieving the best results. Such a course leaves but little to guesswork.

How to Find the Nutritive Ratio.

To find the nutritive ratio of any ration, between the carbohydrates and fats, and the protein, it is first necessary to multiply the weight of the clear fat by $2\frac{1}{4}$, because it is considered $2\frac{1}{4}$ times as valuable to the digestion as the carbohydrates. The product is then added to the carbohydrates, and both are considered as carbohydrates. The protein is then divided into the carbohydrates, and the result is the nutritive ratio. Thus is the table given of the nutrients a laying hen requires, we may find it written: Carbohydrates, 35 per cent.; fat (or clear fat), 3 per cent.; protein, 10 per cent.; ash, 2 per cent. To find the ratio, we multiply the fat (3 per cent.) by $2\frac{1}{4}$, equalling (about) 7, which is added to the carbohydrates (35 per cent.), equalling 42—the total carbohydrates. In order to reduce the proportion to its lowest terms, this 42 is divided by the protein (10 per cent.), giving us the ratio of 1.4.

In order to find the nutritive value of a ration, we must know the chemical analysis of the different grains. The following table gives the amount of digestible nutrients in the principal grain used for feeding poultry. In this table the clear fat has been included under the heading carbohydrates:

<i>Feed.</i>	<i>Prot.</i>	<i>Carb.</i>	<i>Ash.</i>
Beef scraps	66.2	33.1	4.1
Dried fish	44.1	23.2	39.2
Animal meal	32.0	23.0	19.5
Oil meal	29.3	48.5	5.3
Gluten meal	25.8	65.6	.8
Gluten feed	19.4	64.3	1.1
Green cut bone	18.0	43.0	21.5
Peas	16.8	53.4	2.6
Wheat Middlings	12.8	60.7	3.8
Wheat bran	12.2	45.3	5.8
Sunflower seeds	12.1	85.8	2.6
Oatmeal	11.5	65.6	2.9
Alfalfa	11.0	42.3	7.4
Wheat	10.2	73.0	1.8
Wheat screenings	9.8	55.9	2.9
Oats	9.2	56.8	3.0
Millet	8.9	52.2	3.3
Barley	8.9	69.2	2.4
Corn	7.9	76.4	1.5
Buckwheat	7.7	53.3	2.0
Corn meal	6.3	73.2	1.4
Skimmed milk	2.9	5.9	.7
Cabbage	1.8	9.1	1.4
Beets	1.1	10.4	1.1
Turnips	1.0	7.6	.8
Potatoes9	16.5	1.0
Kaffir corn	5.8	56.7	1.3

Skimmed milk, cabbage, beets, turnips and potatoes have from 85 to 90 parts water in 100.

An illustration of the use of this table, and the method of finding the ratio of a mixture, follow:

Scratching Food Formula.

	<i>Lbs.</i>	<i>Prot.</i>	<i>Carb.</i>
Cracked Corn.....	33	260.7	2521.2
Wheat	33	336.0	2409.0
Kaffir Corn	16	92.8	907.2
Millet	3	26.7	156.6
Sunflower Seeds	1	12.1	85.8
Buckwheat	1	7.7	53.3
		<hr/>	<hr/>
Ratio—1: 8.3		736.0	6133.1

For instance, we multiply the quantity (or parts)—corn, 33 pounds—by the proportion of nutrients according to the table of analysis: Protein, 7.9—carbohydrates, 76.1, thus getting the amount of protein and carbohydrates in the various items. We then total all the amounts, and divide the carbohydrates by the protein, giving us the nutritive value or ratio.

No formula of any kind should be followed in an iron-bound, steadfast way, without any deviation whatever. The time of the year and the condition of the fowls naturally necessitate slight changes. A little observation will tell us what the hens do not need or like—it will be the last thing eaten—but care must be used, however, not to give them, or let them, eat only the things they like—chickens must be treated like children with candy in this respect. USE YOUR JUDGMENT—that's what it was given for! There's a world of advice in that one sentence.

In winter, for instance, the amount of cracked corn, or Kaffir corn, should be increased about one-quarter to one-half. During the summer, the amount of these heat-producing grains should be cut down somewhat from the quantities given in the formula, as is also the case during the moulting season, when the hens are very apt to take on fat. The amount of sunflower seeds and buckwheat is also varied according to the season and weather; as it gets warmer, these are cut down one-half each, and during the moulting period and on very cold days they might be doubled. Barley (about 16 lbs.) may be added occasionally to give a greater variety, but it is not necessary to follow this up indefinitely. With the addition of the barley, the ratio is changed to 1:8.1.

The scratching food should be fed early in the morning and a full hour or more before sunset in the afternoon. On an average, one quart is fed to every 20 hens. Birds of the light breeds will not require quite as much as this. Here again the use of judgment will pay profitably. When one finds the hens do not seem to have much relish for the food and do not dig after it in the litter, the quantity should be cut down until the appetite improves. Of course, the grain should be fed in six or eight inches of litter, or it may be raked or spaded into the ground—in any case, the hens should be made to WORK for what they get.

It might seem that the Scratching Food Formula was a fattening ration, but this grain mixture should be fed in connection with a mash food. The method in its entirety brings the whole into a well-balanced ration. Following is the laying mash formula:

Laying Mash Food Formula.

	<i>Lbs.</i>	<i>Prot.</i>	<i>Carb.</i>
Corn meal	30	189.0	2196.0
Middlings	30	384.0	1821.0
Beef scraps	25	1655.0	827.5
Wheat bran	15	183.0	679.5
Oil meal	5	146.5	242.5
Alfalfa	10	111.0	423.0
		2678.5	6189.5

Ratio—1:2.3.

This, as can be seen, is a lower ratio than 1:4, and when this mash is used with the scratching food, we have a well-balanced egg-producing ration. If so desired, beef scraps can be fed extra, increasing the proportion of protein, but this is not absolutely necessary. Wheat bran, if kept before the fowls continually, is excellent in furnishing a bulky food so necessary to counteract the consumption of too much concentrated food (grain, etc.).

The usual mistake in compounding a ration is to get an excess of carbohydrates over protein, with the result that the hen is unable to throw off the surplus heat and soon becomes overfat. Keeping this in mind, one should try to balance the ration so that an excess of one thing (protein over carbohydrates, for instance) will be counteracted by including another grain in which that particular element is weaker, etc.

The writer believes in a *slightly* moistened mash, particularly in winter, when it should be fed hot. One will have to reckon the quantity to be fed by the actions of the hens themselves. Ordinarily, the hens should consume about one-half as much mash as scratching food. Not more should be given than the hens will consume (with avidity) in fifteen or twenty minutes. What is left should be removed. A little experience will teach one how much to prepare each day. Feed the mash food about noon.

The mash food should be prepared as follows: Take a certain quantity of the mash mixture in a pail and an *equal* amount (in bulk) of alfalfa, in another pail (this alfalfa has nothing to do with the quantity of alfalfa already in the mash food—it is in excess of that). Hot water (the hotter the better) is poured on the alfalfa (which soaks up a large quantity), until it is thoroughly saturated. About one quart of water is sufficient for three quarts of alfalfa. The alfalfa is covered and allowed to steam, on the back of the stove, for about half an hour. The dry mash mixture is then added to and thoroughly mixed with this alfalfa. The quantity of moisture in the alfalfa is just about right to make a *crumbly* mixture—that is, when some is taken into the hand and squeezed, it will crumble away when the hand is opened. Under no circumstances should the mash, when fed, be “mucky” or sloppy. A little practice will make one proficient in the amount of water to be put on the alfalfa, so that when the dry mash

is added the entire mixture will be of the proper consistency. In winter a little red pepper and salt can be added, but the red pepper should be omitted as the weather grows warm. In summer fresh-cut lawn clippings are fed for green food, in place of the alfalfa, and then the mash food can be fed without the alfalfa, either slightly moistened or entirely dry.

Little has been said about the keeping of grit, oyster shells, and the "chickens' medicine"—charcoal—before the fowls *at all times*, as this "goes without saying." Fresh water is another thing under the same heading. *Warm* (tepid) water should be given the hens two or three times daily in the winter. Fresh, cool, pure water should be supplied frequently in summer.

The use of stimulating compounds in the feeding of poultry is something poultrymen old in experience will never tolerate—much less advise. A prominent poultryman has well said: "A man going out to feed his flock needs to take along with him more judgment than feed." Small is the judgment that produces eggs (temporarily) by the use of stimulants. A hen that is laying a fair number of eggs is like a piece of mechanism. When running at high rate, if the speed is further increased and greater pressure added, something will get hot—and snap!

Not only is the present or shortly ensuing state of the fowls' health materially lowered by the use of stimulants, but the vitality that has been sapped cannot soon be replaced.

CHAPTER XII.

HOW TO GET A MAXIMUM EGG YIELD IN WINTER.

To get eggs during the winter months, when the price of eggs is highest, thus bringing in the greatest net profit, is the ardent desire of every poultryman's heart. Some people look on this as an extraordinary feat, spoken of by many, but somehow accomplished only by a lucky few. Those who have the temerity to say that they ARE getting a fair egg yield during October, November, December or January, in reply to that eternal question: "Getting any eggs?" are frequently looked upon as eligible members of the Ananias Club. But after all, to get winter eggs is not an impossibility, but they can be had if all the "rules of the game" are observed. Naturally, one must first know these "rules" before they can be followed.

An egg being an act of reproduction, it would naturally be expected to be accomplished solely as nature originally decreed, but Man (with a big capital "M") has seen fit to try to improve on nature and has apparently so far succeeded that the time of reproduction in the case of chickens has been extended from its original period of a few months in spring and early summer, until it now embraces all the twelve months of the year. But though Man has gotten thus far ahead of Nature, as it were, he must ever turn back and obey at least some of the laws he finds he cannot change.

The natural reproducing time of most animals is during spring and summer, when everything is bright and fresh and green, when bugs, worms and various other kinds of succulent nourishment abound in profusion, when it is warm and comfortable for both old and young. Therefore, the poultrykeeper who desires eggs in winter—that is, forces

reproduction at an unnatural time of the year—to get the best results, must profit by what he learns from nature, and make winter as near like summer, in all its phases, as he can. He must bluff the hen into believing that winter is summer, and when the hen calls the bluff, the poultryman must be able to furnish a mighty good imitation, otherwise the hen comes off winner, to the detriment of the egg receipts.

That a maximum egg yield in winter is fostered by housing the hens in warm, dry, comfortable coops is acknowledged by all practical poultrymen. It is quite impossible to get a large number of eggs when the hens have to roost in any coop or box that happens to be available or when they are kept in damp, draughty quarters. A hen that is comfortable in the full sense of the word—that is, warm, well fed, dry, protected from the cold, biting winds of winter, afforded sufficient exercise and so forth—simply cannot keep from laying. One of the reasons that hens lay so many more eggs in summer than they lay in winter is that they are comfortable; they have plenty of green food; are warm, and, if wet from being out during a rain, are not apt to take cold, but will dry off quickly. All this means that the hen does not have to use so much energy in summer in taking care of the bodily wants and, therefore, can place this energy toward egg production.

The animal food the chickens naturally get in summer in the shape of insects, worms, etc., may be easily duplicated in winter by supplying commercial beef scraps, ground bone, etc. As the hen must chase (sometimes long and far) for one grasshopper, or a bug, and only gets a comparatively small supply in the aggregate during a day, the rich beef scraps should be fed sparingly and with discretion. If left to its own choice, a hen may eat more of this rich food than is good for it, much as a child would gorge itself with candy, if possible, in preference to bread.

To get eggs in winter, one must provide the hens with sufficient exercise. This item, so often overlooked, is quite as important as the feeding of the hens. It is essential to both large egg production and the general good health of the fowls. Hens that are fed grain on a hard floor, so that they can pick it up easily without having to work for it, will not pay for their keep. Such birds will fill up their crops in the morning and remain on the roosts most of the day. Proper exercise will not only keep the hen in fine condition, but will give the various organs of the bird the necessary vitality to produce eggs in fair quantities. The best method of affording sufficient exercise, when the fowls are confined in the coops, day after day, throughout the long winter months, is to feed the grain mixture (scratching food, as it is frequently called) in deep litter. This litter should be at least six inches deep, and if it is composed of rye straw, for instance, which breaks up easily, this depth should be from eight to ten inches at first. As the hens scratch in this litter for the grain, the straw will break into short pieces, and more full-length straw can be added from time to time. It is really a pleasant sight to see a number of fowls at the feeding time (and for some time thereafter) digging in litter for their food and "singing" their delight. This "singing" is what foretells nests filled with other than china eggs!

When putting the hens into their winter quarters care should be exercised not to overcrowd the birds. It is a mistake to think that one can put fifty birds where but forty should go and then have as good results. Then the birds roost too closely at night in the cold winter; they are apt to sweat, and upon coming down on the floor of the coop will undoubtedly take cold. This means the starting of disease and trouble which will be hard to eradicate.

Another principal requirement for getting winter eggs is to have good foundation stock. That like produces like is one of the unchangeable laws of nature. No one would expect to breed race horses from truck horse stock; then why expect to breed winter layers from summer-laying parent stock? To get chickens that will lay in winter, therefore, we must breed from parent stock that are good winter layers and whose ancestors for many generations back have been winter layers. Get the chicks hatched early so that they may be well matured and in fine condition to lay before winter comes on. A late hatched chick simply cannot mature before the winter comes on, and as growth and development progress very slowly during the cold weather, egg laying simply has to be deferred until after the hen is quite matured, thus bringing it well toward spring before she starts laying. By getting the hatches off early, and quickly, and successfully maturing the young stock, the chances of getting eggs in winter will be increased fifty per cent.

It is a mistake to let the hens out on the cold, wet ground during the winter. The amount of blood that is continually circulating through the legs of the hens is surprising, and if the birds stand around on wet, cold ground it will seriously affect the egg yield. For this same reason the floor of the pens should not be permitted to get wet or become damp. Hens that are used to one place in winter will not mind being cooped up, provided they are dry and warm. But it is quite out of the question to expect a hen to keep itself warm when standing in snow or slush or upon wet ground.

Another aid to a large egg yield in winter is to supply warm water, instead of giving the hens ice-cold water. While fowls will not drink quite as much water during the winter as during the hot months, yet they require clean water as much at one time as another. The first thing in the morning the water jars or founts should be filled with water which has had the chill taken from it by adding a little warm water. The birds will show their appreciation of this by drinking, even if feed is offered at the same time. They seem to want to drink the first thing in the morning. At night the water founts should be emptied and turned over, or so placed that no dirt or litter can be scratched in before they are filled in the morning. When the birds are fed at noon, the water jars should be inspected to see if they need refilling. When filled at noon, there will probably be enough to last for the remainder of the day. Be sure about this, for a large per cent. of the egg is water, and the hen needs it in egg-making. Do not make the hens pick at snow or frozen water if you wish winter eggs and good healthy birds.

When the work for the night has been completed, and one is ready to go to the house, take up the grain that you will want to use in the morning. This should be put into a large baking or roasting pan, and placed in the oven to warm the first thing in the morning. This grain will hold the heat for some little time after it is fed, and the birds relish this warm grain. This same thing should be done in the morning with the evening's quota of grain.

Last, but far, far from least, is the matter of green food. Put a number of laying hens in early summer into a new run that has a carpet of four or five inches of grass on it, and note in a few days the wonderful change the chickens have wrought. Some of the grass has been scratched up at the roots, of course, but probably 90 per cent. or more has been eaten by the chickens, and in less than a week scarcely a single green blade is left. This is simply another important attribute of eggs in summer. Then doesn't it appeal to one's common sense that green food of some kind positively **MUST** be supplied in winter, if eggs are to be had? Green food, besides being a bulky food,

is also very rich in protein, and protein, as we know, is a prime requisite in egg production. It may be easily supplied in steamed alfalfa, sprouted oats, cabbages, beets, etc., but green food of some description is an absolute necessity. Winter eggs and green food are quite synonymous terms.

These are but a few of the most important things that must be supplied to the hens in winter to induce and aid egg production, and the poultryman who treats his hens as generously in winter as they are able to treat themselves in summer will have little cause to complain of an empty egg basket.

Results are what everyone is after in all lines of business. Results in the poultry business are frequently spelt e-g-g-s—get them by all means—fair means, and “fowl”!

CHAPTER XIII.

MARKETING POULTRY PRODUCTS AT TOP-NOTCH PRICES.

One of the most important requisites of a successful poultry business is a profitable market. No matter what kind of products may be produced on a place, or how varied if they cannot be disposed of profitably the plant can only be classed as a hobby.

The market must be one that will not only take all the goods that the poultryman has to offer, but will also pay prices sufficient to cover the actual cost of production and to leave a fair net profit. The market for the very best quality of fresh eggs is almost unlimited. Although thousands of new poultry plants are started every year, the demand for eggs is still far in excess of the supply.

The production of eggs for table use is one of the most profitable branches of the poultry business.

Large hotels in all the principal cities use daily an enormous quantity of strictly fresh eggs. The writer knows of one moderately-sized hotel in New York City that guaranteed to use all the eggs from a poultry farm that kept about fifteen thousand hens. And such consumption is not at all uncommon. As a rule, yearly contracts are made for a guaranteed delivery of so many crates a day at a stipulated annual price, which in some cases runs as high as fifty cents a dozen. This, it is true, is a market for the larger poultry-keepers; beginners and smaller poultrymen cannot bid, for the simple reason that they cannot produce eggs in sufficient quantities to fill the orders. But statistics prove that only about 5 per cent. of the eggs consumed in the United States are produced by the so-called big poultry plants—that is, plants with over a thousand laying hens. This leaves an enormous market to be supplied by those poultrymen who have smaller flocks.

The poultryman who has about four or five hundred laying hens would find it nearly impossible to retail his eggs a dozen or two at a time, but there is an excellent market waiting just a step away from the retail customer—the restaurants, the soda fountains, and the better class of delicatessen stores constitute this market. They demand the very best eggs, and the prices range within a few cents a dozen of the highest paid. There are many such places in the cities that use every week from one to six cases of strictly fresh eggs. In some

instances these stores buy the best eggs they can get from the commission men, but would be delighted to get new-laid eggs directly from the producer. A market of this kind can easily be worked up by the average poultryman, and will prove highly profitable.

Clubs and hospitals use a great many eggs, and these must be of the very best quality. The numerous sanitariums throughout the country for the treatment of nervous troubles and tuberculosis offer a good market.

If one can produce fancy eggs for a retail market, getting top prices for them, his net profit at the end of the year will be as great as, if not greater than, could be obtained from any other branch of the business.

To build up a retail trade for select table eggs, one must, of course, produce eggs of superior quality; it is on the merit of these that the poultryman keeps desirable customers. Those who do a direct retail business know that a satisfied customer is the best kind of an advertisement.

An important point in marketing eggs is the method of preparing them for delivery. Eggs half covered with dirt and of three or four different colors, shapes, and sizes are far from attractive. All dirt should be carefully wiped from fancy table eggs with a damp cloth until they are well-nigh spotless. They will dry quickly if placed on a cloth or wire tray, and when dry should be packed in cartons—the size that holds one dozen being the most satisfactory.

Considerable care should be used in selecting eggs for packing. Under no circumstances should they be put into the cartons promiscuously, and no spotted, rough, thin-shelled or very small eggs should be sent out. All eggs should be carefully tested, and any that are double-yolked or that contain blood-spots should be discarded. The eggs that are thus rejected can be used at home. A large egg should not be packed next to a small one, nor a dark-shelled egg between two light ones. In a word, only neat, sound eggs should be sold, if one would get the highest price for them. A little care in cleaning and boxing the eggs makes all the difference between a favorable and unfavorable first impression when the customer opens the box.

The carton may be neatly labeled with the number and grade of the eggs and the name of the poultry farm where they were produced. The advertising received from this practice will more than repay the small cost of printing. It need scarcely be said that eggs must be delivered at the earliest possible date. In winter they may be held a week and still be considered fresh, but in summer they must be distributed every day or two.

As a source of revenue and profit to the poultryman, the selling of day-old chicks is of great value. Though of comparatively recent origin, this branch of the business has even now assumed enormous proportions, and the strides that have been made in the past few years attest the favor it has found on all sides. It is necessary that the chicks come from strong, healthy stock, and that they be hatched properly and boxed well, to obtain and hold a market of this kind. Under such circumstances the distance which day-old chicks may be shipped with comfort and safety is surprising.

The production and sale of hatching eggs makes another remunerative source for the wide-awake poultryman through which he may market his poultry products at good prices. The prices received for either hatching eggs or day-old chicks vary greatly, according to the stock and whether it is a utility strain or an exhibition strain. Advertising in local poultry papers will usually bring more orders than one can fill, and as the quality of stock becomes better known, this demand will increase with the enlarging of the plant.

While one is largely compelled to accept whatever price the market is paying for broilers, at the time they are sold, early broilers will naturally bring the best prices. This is another strong argument in favor of getting the chicks hatched early. The average price received for fancy broilers, in the open market, about July 1st, is 38 to 40 cents per pound. By July 15th this price has dropped to 30 cents. Around the first of August it is 25 cents, and by August 10th it is only about 20 cents per pound. This clearly indicates where the best prices and greatest profit lie. To dispose of broilers to private families is, of course, most remunerative.

The secret (if it be one) of getting highest prices is to have highest-quality goods. The quality must not only be brought to the A1 standard, but it must be religiously kept there, with no deterioration whatsoever. In every line of business there is now, and always will be, a demand for the BEST that far exceeds the supply. One does not have to seek a market for poultry products—it is waiting. Why be satisfied with ordinary goods and ordinary prices? Keep only the best stock and get the best prices. It may cost a little more at first to get on this basis, but soon the added receipts will more than even matters up and leave an enviable profit besides.

CHAPTER XIV.

SELECTING AND MATING THE BREEDERS.

The careful selection of the birds that are to go into the breeding pen will more than repay one for the time and trouble taken. Not only is it decidedly advantageous from many points of view, but it is absolutely necessary if one expects to maintain the vigor and increase the egg yield of his flock. As the principle reason for mating up special pens is to get fertile eggs, it is also necessary to look to the fact that improper matings will not hatch strong, livable chicks, and continued breeding from inferior matings will quickly run any flock of fine chickens into worse than mongrels. Every large successful poultry plant is successful because those in charge understand breeding, and have a definite method which they follow closely in mating up their breeding pens. "Ilit-or-miss" breeding is inexcusable on any poultry plant, whether it is run for pleasure or profit. That means it is inexcusable at all times.

The importance of selecting the best males for breeders is self-evident. The male is half the breeding pen, and results, whether good or ill, will be in direct proportion to the qualities the male possesses. Poor results, from using inferior males in the breeding pen, may not be noticed at once, but a year or two later they will become apparent. Considerable labor will then have to be expended before the harm that has been done can be eradicated.

In choosing birds for the breeding pen, one of the most important requisites every bird should possess is GOOD HEALTH, and a plentiful supply of "red-blood" vitality. It should make no difference how perfect a comb a bird possesses or what is its shape or color or other fine points, a poor state of general health should disbar it from being used as a breeder. It should make no difference if the bird has had a disease and seemed to have entirely recovered. The taint of the disease remains, and such a bird will transmit the tendency to the offspring. To use birds as breeders that have had roup at any previous time will be banking up trouble for one's self in direct proportion to

the number of birds that are so used. Any hen that has had diarrhoea will transmit this deadly disease to the offspring, through the egg, and the result will be a large proportion of youngsters that are sickly and puny. The requisite of excellent health in birds chosen as breeders cannot be too strongly emphasized, as it controls to a very large extent the results, and, in many cases, the success or failure, that will be achieved in the future.

The general condition of the birds' health is reflected in their appearance. All birds that are in "the pink of condition" are naturally active. The male will try (and generally succeed) to achieve the title of "Boss of the Ranch." He will be able to best all the weaker males in the pen, and he will sometimes turn his combative propensities toward even the attendant! The female usually shows her vitality in a large egg yield, as well as by general good health. She is on the move from morning until night, scratching for the last piece of grain to fill her already overcrowded crop. Her comb is red—a bright red—and her general appearance is that of business-like activity.

Naturally, birds suffering from any serious defect should not be chosen as breeders. By this is meant such shortcomings as wry tails; poor general shape; white shanks where yellow are desired, or vice versa; a greenish or grayish-colored eye when bay or brown or some other color is preferable; crooked backs or breast bones; flopped combs where they should be upright; points sticking out from the single comb where there should be none, called "side sprigs"; black feathers in birds of white plumage—these, and, in fact, any startling items of difference from what is found in the standard bird of the breed, should disbar such birds from the breeding pens. Such defects will not only greatly mar the good appearance of one's flock, but will seriously interfere with the sale of stock, hatching eggs, or day-old chicks. Of course, such defects as a torn comb or a bruised wattle, resulting from such *exterior* cause as a fight with another bird, would not in the least mar a bird's use as a breeder.

The breeders, both male and female, should be well-matured. Very late-hatched birds cannot mature in time and be of sufficient size and vigor to be used as breeders the following year. Males that are a little over a year old, if early hatched and well grown, mated with hens that are two years old, will give excellent results in fertility and hatchability. Females that are used as breeders should be large for the breed, for the size of the female largely governs the size of the offspring. A mating of yearling hens, or pullets that have passed through and finished their first laying period (*i.e.*, when they are a little over a year old), mated with a two-year-old cock bird, will not give quite as good fertility as the mating just described, but the chicks that are hatched will be exceptionally strong and possess a maximum amount of vitality.

Line Breeding vs. Inbreeding.

Poultrymen frequently resort to what is known as "line breeding" to produce certain desired results. This is breeding birds, which at first may be closely related, that possess as far as possible the particular features sought, and then taking the best of the offspring from this mating and crossing these with the parent stock. As line breeding proceeds, the results desired should become more clearly defined, and the relationship of the birds mated (by losing one point each year) continually grows farther and farther apart, while the natural vitality of the flock steadily improves.

Inbreeding, on the contrary, is mating birds that are closely related, and then permitting the offspring to mate together again, this continuing year after year. For the first and second years the evil effects of such a method (or neglect, as the case may be) may not be particularly noticeable. The third year, or positively by the fourth year, the lowered vitality of the stock will clearly show itself. The flock will be subject to all kinds of diseases, and bird after bird will become ill and die from very slight causes. The egg yield will fall rapidly to a very low point. Fertile eggs will be few and far between, and the chicks that do hatch will have a hard time of it, usually being scrawny, poorly developed, and their chances of growing to maturity are decidedly small.

But, some one says, in line breeding one begins with birds closely related. This may or may not be true. Usually the first pair is closely related, because they possess most fully the points desired, and the breeder knows their "past." But sometimes two unrelated birds can be procured that have sufficient similarity in the points desired to start the strain. This is, of course, preferable. But even where the first pair of birds are related, in line breeding the female offspring is crossed with the sire, and the male offspring is crossed with the original female. Thus a point in relationship is already lost. Every year, by this method of *crossing*, the relationship is lost, point by point, and the danger of bad results from the first inbred mating hardly ever becomes apparent. In inbreeding the first pair is mated, and the offspring is mated together, and the offspring of these birds are again mated together, the relationship continuing so close that none but the worst effects can be had.

How to Select the Laying Hen.

Naturally, it is desirable to breed from those hens that are the best layers or the offspring of line layers, so as to improve the laying qualities of the flock generally. It is impossible to tell exactly just which birds are the best layers in a flock unless trap nests or some similar device has been used. This will immediately show up the good layers, as well as the drones. To breed from a hen that has laid two hundred eggs in a year will be more likely to produce offspring that will be in the two hundred class than if hens that laid only one hundred and twenty eggs in a year are used. "Like begets like" to a very large extent, and this law is applicable to the matings of poultry in particular.

Where one has a large flock and perhaps insufficient time to trap-nest the entire flock, it is quite possible to tell which are the better layers from their appearance alone. A good layer will generally be the last bird to go to roost at night, and the first off in the morning. It makes little difference whether one figures that the hen wants the food to make the egg or whether the growth of the egg compels the hen to hunt for more feed—the layer is always a "hustler."

A long body is usually an excellent indication of a good layer. If such a bird has a broad, low fluff she is undoubtedly one of the best to choose as a breeder, and will surely improve the egg yield. She should also have a large, broad breast, indicating large crop capacity, so essential to good egg production. A bright eye, bright red comb, legs set well apart, general good health, and plenty of activity are all sure indications that a hen will "produce the goods." Close study of the individual birds will soon enable one to pick his best layers without the aid of trap nests, though the use of the latter precludes any possibility of doubt.

When the proper feed is given, and other conditions are favorable, one should have little trouble in breeding a large flock that will average well above one hundred and fifty eggs a year. The average egg yield of the poultry in the United States, including that kept on the farms, etc., is less than eighty eggs per hen per year! And yet, on the contrary, a flock of six hens, in a recent egg-laying contest held in Australia, laid 1,589 eggs in one year—an average of about 265 eggs for each one of the six hens! Such a pen is not a haphazard accident, but is the direct result of careful breeding with a definite purpose in view. A record of this kind shows what can be done with good foundation stock that is properly bred, properly fed, and properly cared for.

When to Mate the Breeding Pen.

Those who desire early hatched chicks from winter-laying birds (and these are the profitable ones) usually mate up their breeding pens about the first of the year, certainly by the middle of February at the latest. As the eggs from a mating will not run sufficiently fertile to hatch strong chicks much before ten days or so, if one mates up his breeders about the first week in January he should be able to begin saving eggs for hatching about the middle of the month. If he sets these after two weeks' accumulation, or about the first of February, he should have a fine lot of youngsters running around before the first of March. With proper care and feeding these chicks should mature and lay by about the first of September. As the older hens are beginning to moult about this time, the eggs laid by those early hatched pullets will come at just the right time to fill in the gap that is made in the egg yield by the non-production of eggs by the moulting hens. Those who fear that the pullets hatched in the latter part of February will moult after laying for a while, can obviate any danger of this by waiting about two or three weeks before they start hatching in the spring.

CHAPTER XV.

HOW TO GET FERTILE AND HATCHABLE EGGS.

To get a better percentage of fertility, and eggs that will hatch well, it is best to keep the male birds away from the females all during the winter, or at least for about two or three weeks previous to the time the matings are to be made. This will give the male bird more vitality; he will be more attentive to the hens when they run together, and the result will be a greater number of strongly fertilized eggs. If possible, it is best to have pens that accommodate about fifteen birds, as this will not necessitate putting two males in one pen. When two males run together with a number of females, it will cause continual fighting between them, and this seriously interferes with the proper fertilization of the eggs. It is also liable to cause serious injury to one of the males from their fighting, and the fellow who comes off second best will be continually "nagged" by his superior, rendering him almost useless. More fertile eggs will be had from a dozen hens with one male than with twenty hens that have two male birds in the same pen with them.

It is decidedly advantageous in the matter of getting fertile eggs to change the male birds from one pen to another occasionally. After a male has been running with a number of hens for an indefinite period, he will select a few "favorites" and will pay attention to these, neglecting the others to a more or less extent. By changing the males from one pen to another frequently, this trouble will be obviated to a large extent, resulting in eggs that will be better fertilized.

The number of hens that can be put with one male to get the best results will depend on the breed and on the "quality" of the male bird. Grouping all the heavy birds together, it might be safe to say that ten or twelve females to one male should give satisfactory results. In the case of the lighter breeds, which are naturally more active, as many as fifteen or sixteen females with one male will not be too many. If the male birds are changed from pen to pen occasionally, and taken apart from the hens once in a while and kept in seclusion for a week or so, and if they are particularly active, one or two more hens than given in the above figures may be safely put into the breeding pen. "The proof of the pudding is in the eating," and the results of the first or second hatches will be the best guide to judge whether there are too many female birds in the pen, or if the male is inactive.

The feed that the breeders get will also govern the fertility and hatchability of the eggs. While no forcing food should be fed the breeders, they need some meat food and a *limited* quantity of bone. The best way to feed these two things is to give the birds a liberal supply of commercial beef scraps. This usually contains sufficient ground bone, and if this food is kept before the birds continually they will consume only what they need. Beef scraps should not be fed spasmodically, however, as this will upset the digestive organs of the birds. Bulky food (mash or bran) should be before the breeders at all times. Plenty of succulent green food should be given the hens. This can be easily fed by giving plenty of lawn clippings, or in such ways as steaming alfalfa, by growing (sprouting) oats, or feeding cabbages, beets, and so forth.

The scratching food should be fed in *deep* litter if fertile eggs are to be had. A lack of sufficient exercise causes more infertility and poor hatchability in eggs than inattentive males. The more exercise a hen gets the more eggs—fertile eggs—she will lay. Eight inches of chaff or straw or litter of any kind is none too much in which to throw the scratching grain.

A little care in choosing the birds for the breeding pen and in caring for them, with especial attention to the matter of keeping these birds healthy by feeding them properly, will give surprising results in a maximum yield of fertile eggs that will hatch strong, livable chicks.

CHAPTER XVI.

HOW TO INSURE AND ASSIST AN EARLY MOLT.

A yearling hen and a young pullet are alike in one respect: if they do not start laying before real cold weather sets in they will lay but few eggs during the winter. Hence, it is of the utmost importance, in getting a large winter egg yield, to get the hens to start molting **EARLY**, and to have them practically through the molt with a new set of feathers grown before the first of November.

The length of the molting period varies with individual birds. The time different birds, even in the same flock, will start to shed their feathers also varies greatly. Usually hens will take anywhere from sixty to ninety days to complete the molt. The later the birds start molting, ordinarily, the longer it will take them. Sometimes, some birds will take as long as four months in which to molt, but such birds are more the exception than the rule. If left to their own devices, some hens will start molting in the latter part of August; but it is usually well toward the middle of September before the majority of the flock will begin shedding the old coat of feathers. Averaging the first of September as the time the majority of the hens will start the molt, makes it about the first of December before the hens will be ready to start laying. As the weather has probably been very cold for the previous month or more, the hens will have about all they can do to grow the new coat of feathers during the month of November, hence cannot spare any energy from this task and that of keeping their bodies warm, to put toward egg production. This means that few, if any, eggs will be received from the flock of yearlings until early in the spring.

To assist the hen in getting an early start in molting is quite within the possibilities of the average poultry keeper. It is largely a matter of judicious feeding. During the molting period the hen needs certain foods that will assist her in loosening the old feathers and in growing the new coat. If the proper food is supplied, the molt can be hastened, both in time of starting and in duration. The constitution of the hen will not be injured—in fact, it will in all probability be strengthened. The molting period is a severe tax on the strength of the hen. It should not be forced during this period, but should be materially assisted. Proper food will do this better than anything else.

It should be the object of all who desire to get eggs during the winter from their yearling hens to get them started molting by the *first of August*. The molt will then be completed by or before the first of November. Then when cold weather arrives the hen will be able to use all her energy toward keeping warm and producing eggs.

The Method.

During the last two weeks of July (that is, beginning about the fifteenth of July), the quantity of food should be *gradually* lessened. This can be easily done by curtailing a small quantity each day of the two weeks. The quantity should be so curtailed that on the first of August the hens will be getting about HALF the quantity they had received before the fifteenth of July. This applies to both the grain that is fed in the litter and to the mash food. Some poultrymen say to "starve the hens" during the early molting period. This is a gross mistake. Hens that are molting are undergoing a very great tax on the system, and it is utter foolishness to starve anything that in reality needs extra nourishment. The reason for slightly curtailing the amount of feed is simply to loosen the old feathers. When one begins curtailing the amount of feed, the amount of sunflower seeds should be increased one-half. All during the molting period, and particularly during the first month, the hens must be supplied with more green food than they can eat. They must be forced, by curtailing the grain fed, to eat larger quantities of green food than they might otherwise consume. By giving them more green food than they will eat each day, one will be sure they never have too little. The success of the early molt depends largely on the generous supply of green food.

By the first of August a great many birds should begin to show that they are starting to molt. This is clearly indicated by the increasing quantity of feathers on the dropping boards and around the pens and yards. Also by the scarcity of feathers on the chickens' necks—the place they generally begin shedding the feathers first.

As the hens now need more nourishment, the amount of feed should be *gradually* increased—a little each day—for the next two weeks, until at the end of that time they should be getting the usual quantity. As one starts increasing the quantity of food, increase also the quantity of sunflower seeds, until at the end of two weeks the amount used in the mixture is double the regular quantity. All buckwheat should be omitted from the ration as soon as the birds start molting. **GREEN FOOD IN ABUNDANCE AT ALL TIMES.**

To give an illustration of the method of feeding: If one had a flock of eighty (80) yearling hens, he would be feeding them about two quarts of grain in the morning and four quarts at night, with about three quarts of mash at noon. Beginning the fifteenth of July, he would curtail the morning, noon and night feedings a trifle each day, until on the first of August he would be feeding one quart of grain in the morning, one and a half quarts of mash at noon, and two quarts of grain at night. In making up the grain mixture at this time (August 1st), the amount of sunflower seeds would be three pounds to a mixture instead of two, as given in the formula in the chapter on "Scientific Feeding for Eggs." One would give more green food daily than the hens could eat.

After the first of August the amount of food would be increased a trifle each day for the next two weeks, until the fifteenth of August, when the quantity would be the same as that fed before the change (July 15th), or two quarts of grain in the morning, three quarts of mash at noon, and four quarts of grain at night—with plenty of green food daily. *No buckwheat* at all during the entire molting period.

After the fifteenth of August the quantity of sunflower seeds should be four pounds to the mixture, instead of two or three pounds. This quantity should be so continued throughout the rest of the molting period. At the same time (about August 15th), put double the amount of linseed meal into the mash for laying hens, the rest of the mash formula to be the same. The regular method of feeding is followed during the rest of the molting period, care being taken not to overfeed.

The reason for the increase of both sunflower seeds and linseed meal is that these are very rich in oil, and aid materially in furnishing the hen with sufficient oil to grow a new coat of feathers more easily, and to improve the gloss of the new feathers.

If one finds that the hens are becoming overfat, and the molting hen is much given to standing around, hence will easily take on fat, the amount of food given must be cut down until the appetite improves. One's judgment is the best guide in this matter. Make the molting hens work for what they get, but see that they are able to get something when they work for it!

By following this method of feeding through the first stages of the molt, and with proper care in general, the birds should start molting early and finish in the shortest possible space of time. Of course, the egg yield will suffer somewhat during the early part of the molt, and one may not like to lose eggs when others about him are getting them in fair quantities, but this temporary loss will be more than equalled by the eggs that will be received during the winter. And it is far better to get eggs from the yearling hens, when eggs are bringing top prices, than to get them in summer at lower prices and be compelled to carry the hens over the winter, receiving few, if any, eggs to offset the high price of grain.

CHAPTER XVII.

THE PREVENTION OF DISEASE.

The cold winter months may bring with them a certain amount of trouble for the poultryman. Despite the fact that one may care for his fowls in the most conscientious manner, disease may creep into the flock from no apparent cause. Under such conditions it is the man who is properly prepared to combat illness among his birds that suffers the least loss.

Naturally, if disease comes on through neglect of the poultry keeper, he has but himself to blame. His chances of saving many of his fowls are, for the same reason, rather small. Neglect on the poultry plant is inexcusable under any circumstances, and always disastrous in the long run.

Where disease creeps in from no apparent cause, however, and after all ordinary precautions have been taken, there is but one thing for the energetic poultryman to do—*find the cause and remove it*, at the same time doing all in his power to prevent the spreading of the disease through the flock.

Every poultry keeper should possess a book treating on poultry diseases. This should be carefully studied, until one is thoroughly familiar with the causes and symptoms of the more common diseases to which fowls are heir. Then when one sees a fowl that seems doxy and stands around, refusing to eat, he will be able more readily to diagnose the disease. By applying the remedies suggested in the book, the fowl may then be easily cured.

One of the principal causes of numerous diseases (and one which many poultrymen overlook) is low vitality. This may be the result of poor breeding, poor feeding, improper care, etc. Poor vitality is without doubt the underlying reason why some fowls contract disease, when other birds kept under exactly the same conditions are perfectly free from all sickness.

Unsanitary conditions in and around the coops will breed more disease than any ordinary person can hope to combat. Cleanliness with chickens is positively as essential as feed and water. Though its absence may not be noted as quickly, its disastrous effects will be fully as great. Lice, mites and other vermin that breed in filth, and which sap the health and strength of the fowls, is only one of the troubles that result from a lack of cleanliness.

Improper food, or poor food, will sometimes seriously affect the health of one's flock. To feed moldy grain is to positively insure much trouble and loss. It makes no difference whether this is done in ignorance or purposely, the resultant harm is the same. Nature never makes a mistake, hence never makes any allowance for mistakes.

These and other local factors have an important bearing on the sickness or health of one's flock and must be looked after carefully at all times.

To be able to recognize sick fowls at a glance and to diagnose their cases, is an art desired by all poultrymen. Those who are most adept in this line are indeed fortunate. However, this is within the reach of anyone who will give this important phase of the business the attention it justly deserves. To become proficient in detecting and diagnosing disease takes considerable time and much application. One must possess a quick, keen eye that is able to note at once the slightest difference in a fowl's appearance and actions. If this were simply noted, however, and no connection made with other slight changes ap-

pearing in the bird, it would do no good at all. One must be able to make a local application of what he has discovered, to the end that he may be able to treat the bird in the proper way to get at the ailment. A process of elimination is one of the easiest methods—*i.e.*, to localize the disease as much as possible. Then by taking into consideration all the symptoms apparent, the real trouble can be ascertained and properly treated.

One thing is positively essential in treating sick fowls, if the spread of the disease is to be checked: They must be removed AT ONCE from all well fowls and placed by themselves. Herein is one of the principal advantages enjoyed by the good diagnostician: he immediately discovers and removes any fowls that have the slightest symptoms of illness before the disease has any chance to spread.

To care for sick fowls properly, one must have a "hospital coop"—*i.e.*, some place detached and away from all other coops, where ailing birds can be quarantined and treated. There are two very important requisites to such a coop: warmth and proper ventilation. A sick chicken's vitality is far below normal, and it should be kept warm and comfortable so that every particle of its energy can be used in combating the disease. Warmth, however, must be accompanied by proper ventilation. Sunshine and fresh air are probably the greatest antidotes for all diseases. But air must be admitted to the coop in such a way that all draughts are entirely eliminated. Muslin permits air to enter a coop gently and also allows the impure air inside to escape. If the amount of muslin is properly proportioned to the size of the coop and glass it contains, and suitably placed, little trouble will be had in keeping the air inside the coop both warm and fresh at the same time.

Of course, the best way to prevent loss from disease is to keep the birds healthy. It is far better to spend an hour a day doing the things that will *prevent* sickness, than it is to spend three times as long doctoring sick birds. "An ounce of prevention is worth more than tons of cure."

CHAPTER XVIII.

"FREE" POULTRY FOODS.

There are two foods for poultry that cost actually nothing in cash, yet many poultrymen are less generous with these than with other feed costing \$2.50 per 100 pounds. These "free" foods are: Fresh water and green grass.

Water constitutes over 75 per cent. of the bulk of an egg, and almost as large a proportion of the chick's body is water. An active little chick, running its legs off, needs a large quantity of water to replenish this waste, as well as for its rapid growth. Chickens of all ages that leave stale or warm water practically untouched, when given fresh, cool water, will immediately form a circle around the fountain, and as they drink raise their heads in thanksgiving. Give the chickens more fresh water and give it more *frequently*. It costs absolutely nothing. The result will be a saving on the grain bills, as well as a noticeable increase in the chick's growth and development, and the laying qualities of the hens.

Green grass (lawn clippings) makes an excellent food for chickens of any and all ages. Frequently the writer has seen chickens leave both grain and mash and partake of lawn clippings that were given

them. If any one doubts a chicken's appetite for green food, let him put a flock of chicks in a yard or run entirely covered with grass, and then watch it disappear, not in weeks, but in days. Pretty good proof they like it, isn't it? And when the chick's run is entirely cleared of green food, where are they to get a supply from, unless the poultry keeper furnishes it?

An easy method of obtaining lawn clippings, without the bother of raking them up, is to purchase in a hardware store what is known as a grass-catcher for a lawn mower. The usual price is about seventy-five cents. This catcher can be easily and quickly attached to, and detached from, the lawn mower, behind the roller. As the blades of the mower cut the grass, the clippings fly into the catcher, and can be put into a basket and fed to the chickens later. The absence of dead and dying grass clippings will also greatly improve the appearance and life of the lawn.

Grass is very rich in protein, an element that is an absolute necessity to the chick's growth, for the maintenance of its body, as well as for a large egg yield. If this valuable ingredient can be gotten in grass, for the cutting, why pay high prices to feed it in grain? Feed more of these "free" foods. They furnish invaluable elements that will grow the chicks into sturdy, active cockerels, and pullets that lay golden eggs.

CHAPTER XIX.

HOW TO GROW SPROUTED OATS.

Practical poultrymen all agree that it is quite impossible to get eggs in large quantities if the hens are not fed a generous supply of green food. One of the principal reasons that hens lay more eggs in spring and summer than in winter, aside from the fact that this is the natural reproducing time, is because there is a plentiful supply of succulent green food available during this period. Hens that are on free range, where they can get sufficient green food, will lay a great many more eggs than will the same number of hens that are confined in a yard which is bare of all grass.

There are certain nourishing properties in green food that are not to be found in other food consumed by fowls, and that cannot be well supplied in any other kind of food. Hens that have sufficient grain or mash food continually before them will leave all this when given some succulent green food. This alone should prove conclusively to those who might have any doubts, that green food is an absolute necessity for large egg production, and that hens should be given liberal supplies of this most necessary food.

If properly done, the growing of sprouted oats can be accomplished with very little trouble and labor. The principal secret of growing oats, if it can be termed a secret, is to know how to water the oats properly the first week. If this item is given the attention it deserves, the actual care in growing the oats is very small. Those who have never tried to sprout oats are, in some cases, held off by an indefinite fear of not being able to successfully grow the oats; but a little actual experience will quickly dispel such feelings.

The method generally used in sprouting oats is as follows: take an ordinary pail, either metal or wooden, and fill it with oats to within about three or four inches of the top. As the oats swell considerably in a short time, if the pail is filled too near the top either the oats will fall out over the top or the water will run out. Into this painful

of oats pour in water until it comes to the top of the oats. When this water is being poured into the pail, the oats will rise but can be pressed down with the hand. All the oats should be thoroughly wet by raising those from the bottom of the pail and pressing those on top farther down. The water that is poured on the oats should be as warm as one can bear on the hand—it should not be boiling, as this would scald the oats and interfere with proper growth.

The pail of oats should soak for at least twelve, and preferably twenty-four, hours. The oats, which are then considerably swollen and thoroughly wet, should be placed in trays that may be of almost any size, but that should have sides about three inches high. Place the oats in the trays to a depth of two inches, levelled off. There is absolutely nothing in the bottom of the tray except the bottom boards—no dirt, paper, straw, or other material for the oats to grow on. Literally, they grow on themselves, the roots forming a solid mat within a week. Holes should be bored in the bottom of the trays, like a sieve, or cracks made, to permit most of the water to run off, otherwise the oats will soon sour.

After the oats are placed in the trays to a depth of about two inches, there is little more to do for the ensuing ten days or two weeks but to water them. The trays should be placed in a warm cellar or room where the temperature does not drop much below fifty degrees; if warmer, the oats will simply sprout quicker. The oats must be thoroughly soaked with water at least twice every day (morning and evening) for the first week or ten days and thereafter once a day. If one desires a rapid growth, the oats may be placed in a warm room (of about seventy degrees temperature), and watered three times daily for the first week or so, but this is necessary only when there is a special hurry in which to get the oats sprouted.

The water with which the oats are wet daily should be lukewarm or about the temperature that is comfortable for one to place the hand in. It is easiest to apply the water from an ordinary garden sprinkling can. The surplus water can run off through the holes in the bottom of the trays. If the trays are placed above one another, the surplus water will run down from one tray to the next, thus giving the lower trays the advantage of a double wetting. On the fourth day, and also on the seventh and tenth days, once each day, instead of putting on warm water, use cool water as it runs from the faucet. This change from warm to cold water seems to give the oats new life, and a rapid growth will be noted almost immediately after. Proper watering of the oats will aid materially a rapid growth.

When the oats are about four or five days old, small sprouts begin to appear, and these grow noticeably daily. At the end of a week, these sprouts are about two or three inches long, and in two weeks may be as much as seven or nine inches long. Instead of permitting the sprouts or blades of grass (as they resemble grass blades very much) to grow to this length, the tops should be cut when about four inches high. An ordinary pair of grass shears will cut the sprouts easily and quickly. The undergrowth will then sprout out again, and sometimes as many as three clippings can be had before the remaining oats and sprouts are fed to the chickens. If it is desired to have a green color to the sprouts (when they are grown in the dim light of a cellar the sprouts will usually be light yellow in color), this may be obtained by placing the oat trays in the sunlight or near a window for a day or so. After the oats have been clipped two or three times they can be fed by cutting out chunks of the sprouts, roots and all, and given in this way to the hens, or the entire tray may be placed in the coop. The latter method is preferable, as the hens relish picking and scratching in the tray, and they will eat practically all of the contents.

A frame to hold a number of trays can be made by almost any one and with but little labor. Four pieces of two-inch by four-inch lumber are the uprights used for the corners, and cross cleats, one inch by two inches, both hold these four corner pieces together and form the places on which the trays slide in and out when the oats are being watered. These cross cleats should be about eight inches apart, to afford sufficient room for the sprouts to grow up. The easiest tray to handle is about one foot wide and two feet long, the sides, of course, being about three inches high. An ordinary sixteen-quart pail, when about three quarters full of oats, after soaking for twenty-four hours will fill a section of six trays of the above dimensions. One tray will give sufficient cut sprouts for about twenty-five or thirty hens, and if there are seven of these trays a succession of croppings can be had each day that will permit the first tray to be in shape for a second cutting at the end of a week. By having three or four sections a large number of fowls can be given plenty of sprouted oats. The labor of growing the oats will be decidedly small when compared with the marked increase in the egg production. Sufficient succulent green food given the hens during the winter produces eggs at the time when eggs mean money.

CHAPTER XX.

A WORD OF ENCOURAGEMENT.

Beginners should not be discouraged when they find they are not getting many eggs, or when the number received is seemingly small. It is true it is not very pleasant to read of big egg receipts by some when one is getting but few, but remember that there are many circumstances that account for this. If, as in most cases, it is the big breeder who is doing so well, remember he has spent *years* in patient care to breed a strain and flock to this point. With his fund of practical experience behind him, naturally he can obtain results quite beyond the power of the beginner to reproduce. The older poultryman has studied his fowls for a long time until he has been able to find out just what they need, and can feed the foods that will produce a maximum number of eggs, and still keep the hens' vitality intact. Don't expect to duplicate such results at the beginning. They can and will be achieved in due time.

The keeping of a diary is an excellent accessory to a good system. There is a great deal of satisfaction in occasionally going over the work of the previous year, as briefly recorded in a diary, to have the mistakes and errors that have been made brought vividly before one's mind—not to be repeated. The joys and pleasures one has experienced may also be lived over again and again—this alone repays one for the few minutes spent each day in making entries. Then again, when everything appears to be going wrong, despite the very best one can do, and when it seems as if one never before could have had greater discouragements, to pick up the diary and read of other heavier trials and disappointments one has *lived through and overcome*, will put new vim into one, and one can tackle the present problems with renewed vigor and zeal and turn the tide toward success.

There is one, and only one, stimulant the writer advocates, and that he recommends most highly. It is *not* for the hen; it is "stick-to-itiveness" for the poultryman. Sounds rather sticky, but that's just what it means. It's a sort of "ginger" that keeps the poultryman's interest excited when it might otherwise flag. It produces maximum results, and, best of all, it permits no reaction.

If at times things on the poultry plant do not go as smoothly as one might wish, remember *everyone* in the poultry business has gone through the same troubles, not only once, but *many times*. Give yourself the encouragement that is always to be derived from intense enthusiasm. Say to yourself: "Some have failed, but many others have succeeded, so it is possible—I WILL SUCCEED, TOO!" That's the spirit. Then buckle to with double the energy and enthusiasm displayed before; *profit by your mistakes*; learn all you can from every available source; fight manfully on, and it will not be long before people will point you out as a man who SUCCEEDED with poultry.

"If the day looks kind o' gloomy
An' your chances rather slim,
If the situation's puzzlin'
An' the prospect's awful grim,
An' perplexities keep pressin'
Till all hope is nearly gone—
Just bristle up an' grit your teeth,
An' keep on keepin' on."



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